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The Journal
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VOL. XXXVI. MAY, 1892. No. 171.
[Monthly Issue.]

Friday, March 11, 1892.

GENERAL SIR C. P. BEAUCHAMP WALKER, K.C.B., Vice-President, in the Chair.

PIGEONS FOR LAND AND SEA SERVICE, WITH EXAMPLES FROM RECENT EXPERIMENTS.

By W. R. TEGETMEIER, Esq.

SIR BEAUCHAMP WALKER AND GENTLEMEN,

I am quite aware that two lectures have been delivered in this room on the subject on which I have the honour to address you, and I may say that I have read those lectures carefully, and with very much interest. In one or two points I may differ from the authors, but I cannot but express my thanks to them for the information which they have conveyed to us, and if I do differ from them I shall say so with some degree of hesitation.

The subject that is proposed to us to-day is—Pigeons for Land and Sea Service, and also with reference to the Recent Development of their Utilization. The two lectures of which I speak really dealt a great deal with the modern development of their utilization. The lecture by Major Allatt was given five years ago,[1] and it was accompanied by maps, which he has done the kindness to lend me, which were also reproduced in the Journal of the Institution.

The lecture by Captain Aston[2] was given only two years ago, and that was from a rather different standpoint.

The accompanying map, which was compiled during the course of last year, will give you an exceedingly good idea of the extensive organization that now prevails on the Continent with regard to the utilization of pigeons for military purposes. The map, as it were,

[1] See Journal, vol. xxx, No. 133, 1886.

[2] Delivered before the Metropolitan Volunteer Sergeants' Tactical Association, in the theatre of the R.U.S.I., January 13, 1891, and published as a pamphlet (reprinted from "Homing News," February 20, 1891).

speaks for itself. It was taken from a French source, "La Nature," and was used by me in an article published in the English "Nature" during last month. Every one of the lines upon the map shows a pigeon post. In most cases it shows a double post, that is to say, there are relays of pigeons at each end of those lines, so that, for example, not only can birds be sent from Paris to the fortresses on the German frontier of France, but others can also be sent from those fortresses back to Paris. There is a large organization of homing pigeons in Paris, and there are lofts for homing pigeons at every one of those forts. You see that this system extends throughout France, Germany, Austria, Russia, Spain, Italy, and Portugal, and, in fact, already extends into Africa. The utilization of pigeons for military purposes, therefore, may be taken as accepted, and as no longer requiring to be proved. I urged this myself more than twenty years ago, in a letter which was published in the "Times" of the date of January 27, 1872. I wrote that letter after liberating a flock of some 300 homing pigeons to fly to Brussels, 200 miles off. After liberating the pigeons I went to the telegraph office in the Crystal Palace, and announced the departure of the birds. I telegraphed, "Birds off; weather fine; wind south-west." The pigeons arrived and gave notice that they had been liberated before the telegram announcing their departure had been delivered. The first birds arrived in Brussels at 5.28. There was, of course, considerable delay in the telegraph; they were not as expeditious then as they are now; but, as I say, the telegram was not delivered until three or four minutes after the arrival of the first pigeon. On that occasion I wrote the letter to the "Times," in which I said: "The Prussians, wise in their generation, have taken lessons from the Parisians, and established pigeon posts into Metz and their other fortified towns. In the event of a war in which we may be engaged, what would be the value of birds that would convey messages to Jersey, Guernsey, &c., when the telegraph wires had been cut by the enemy?" The matter now may be considered as so well established that I will not dwell upon this point, but I would just take the liberty of reading to you a couple of letters that I have received on the subject. The writer of one of those letters, I am happy to say, is present, and will no doubt give us the benefit of his experience. Major Allatt writes to me:—

"It may interest you to learn that a loft is about to be established at Gibraltar. I had a letter on the subject a fortnight ago. About three months ago the Naval Intelligence Department of the Admiralty sent round a circular letter to many of the flying clubs to ascertain how many birds they had in training, and what would be the routes then worked over, so that I presume there is an idea to make use of pigeons for naval work. Captain Brittan, R.M.A., now at the Admiralty, in London, has the matter in hand."

Singularly enough, only two or three days before the receipt of that letter from Major Allatt, I had a letter from Major Hussey, R.E., at Gibraltar, a gentleman with whom I had not had the pleasure of any previous acquaintance. He wrote to me:—

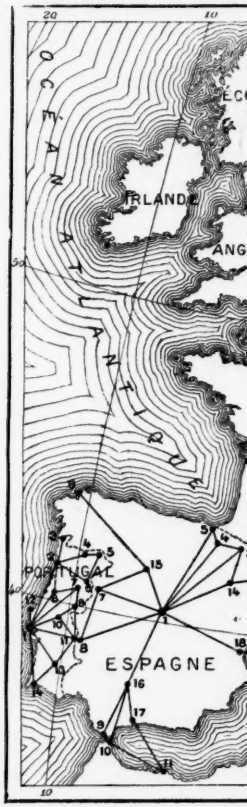

CHART SHOWING THE

FRANCE: 1, Mont Valérien; 2, Par
11, Langres; 12, Belfort; 13,

PORTUGAL: 1, Lisbonne; 2, Porto
10, Abrantès; 11, Elvas; 12,

ESPAGNE: 1, Madrid; 2, Figueras;
11, Melilla; 12, Palma; 13, M

ITALIE: 1, Rome; 2, Ancone;
10, Vinadio; 11, La Maddalen

SUISSE: 1, Thun; 2, Bâle; 3, Zuric

ALLEMAGNE: 1, Berlin; 2, Cologne
9, Tonning; 10, Kiel; 11, Stet

AUTRICHE: 1, Comorn; 2, Cracovie

DANEMARK: 1, Copenhague.

SUÉDE: Carlsborg.

RUSSIE: 1, Brest-Litovsk; 2, Varso

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SHOWING THE SYSTEM OF MILITARY PIGEON POSTS IN THE CONTINENTAL KINGDOMS.

Valérien; 2, Paris; 3, Vincennes; 4, Lille; 5, Douai; 6, Valenciennes; 7, Maubeuge; 8, Mézières; 9, Verdun; 10, Toul; 12, Belfort; 13, Besançon; 14, Lyon; 15, Marseille; 16, Perpignan; 17, Grenoble; 18, Briançon.

isbonne; 2, Porto; 3, Valence; 4, Chaves; 5, Bragance; 6, Almeida; 7, Guarda; 8, Coimbre; 9, Castello Branco; s; 11, Elvas; 12, Peniche; 13, Beja; 14, Lagos.

drid; 2, Figueras; 3, Iaca; 4, Pamplona; 5, Ovarsun; 6, Ferrol; 7, Ciudad-Rodrigo; 8, Badajoz; 9, Tarifa; 10, Ceuta; 12, Palma; 13, Mahon; 14, Zaragoza; 15, Valladolid; 16, Cordoba; 17, Malaga; 18, Valencia.

e; 2, Ancone; 3, Bologne; 4, Vérone; 5, Plaisance; 6, Alexandrie; 7, Mont Cenis; 8, Fenestrelle; 9, Exiles; ; 11, La Maddalena; 12, Cagliari; 13, Gaeta; 14, Génova.

; 2, Bâle; 3, Zurich; 4, Weesen.

Berlin; 2, Cologne; 3, Metz; 4, Mayence; 5, Wurtzbourg; 6, Strasbourg; 7, Schwetzingen (en projet); 8, Wilhelmshaven; ; 10, Kiel; 11, Stettin; 12, Dantzig; 13, Kœnigsberg; 14, Thorn; 15, Posen; 16, Breslau; 17, Torgau.

morn; 2, Cracovie; 3, Franzenfeste; 4, Karlsburg; 5, Serajewo; 6, Mostar; 7, Trieste.

openhague.

g.

-Litovsk; 2, Varsovie; 3, Novo-Georgievsk; 4, Ivangorod; 5, Luninetz.

permission, from Mr. Tegetmeier's article in "NATURE," Feb. 4, 1892, on "The Utilisation of Homing Pigeons."

"DEAR SIR,—I have been instructed by H.E. the Governor to start a system of pigeon post between Gibraltar and Tangier, and have already constructed a loft which I trust will answer the requirements at first, and can be improved later on. The loft is circular, about 30 feet in diameter, and 8 feet 6 inches high. I am now writing to ask your advice as to birds. It will, I know, be difficult to obtain money from the War Office for this service, but I am so convinced of the great advantages to be derived from this system that I am prepared to incur some small expense to make a start on however small a scale."

When such men take the matter up there is no doubt it will be done effectually. Major Hussey must feel great interest in the matter, otherwise he would not write in this manner. I may tell you now that unless men who take personal interest in the birds can be got to superintend them, look after them, and train them properly, there is very little hope of establishing pigeon lofts and pigeon communication successfully. The pigeon-keeper must be a man who takes an interest in the matter, and has a love of the pursuit.

I think I shall have occasion to show you that it will be, in our country at least, very advantageous to depend upon the racing clubs for the supply of birds. If you will look at the map you will see that one of the few countries on the Continent where there are no pigeon posts is Belgium. Well, there are 600,000 racing birds in Belgium, and every one of these, in the case of a war, would be put at the disposal of the Government. Every one of these is a trained bird. They used to train them over the south of France, but that is now interdicted, and no birds from Belgium or Germany are allowed to be trained in France. Fortunately for our own pigeon fanciers this restriction does not apply to England, and I have here the Regulation which permits our birds being flown from France, a permission that is not accorded to the Belgian or German birds. Of course it is obvious to you, as military men, why this permission should not be accorded. In the event of a war birds would be smuggled into the interior, and information could be carried out. So many of our flying clubs have trained over to Cherbourg and other places in France that it would have been a very great hardship to have prevented them, and so the application was made, and I will read to you this short account from the "Stock-keeper" of the present month to show how the matter stands:—

"We have much pleasure in calling our readers' attention to a letter in our columns with reference to the liberation of English birds in the south-west of France. Committees must remember to furnish their *convoyeurs* with the necessary certificate from authorized authorities of the town where the club is held."

This is the letter from the Secretary of the London Flying Club:—

"SIR,—In accordance with my promise I enclose herewith copy of a letter sent to Her Majesty's Minister in Paris on the above subject, and which he has been good enough to send to me.

"'To the Minister.

"'By a Memorandum dated the 2nd of this month you have expressed a wish to know if English pigeon societies will be allowed to liberate their birds in France. I have the honour to inform you that the liberation of pigeons will continue to be authorized on the conditions that the senders are English; the production (*provenance*) of the pigeons also English, and be attested by certificates duly authorized by the authorities of the place from whence they came. Believe me, &c. (Signed) RIBOT.'"

That will give you some idea of the precautions that the French are taking against the introduction of trained pigeons from other countries; if you will again look at my map you will find a large number of pigeon posts that emanate from Paris. Not one of them comes towards the coast opposite England. They have no fear of us, and no idea that we shall utilize the birds in any way against them; and they make no arrangement, at present at least, to get information from the coast of France to Paris. All the pigeons go to the German frontier and the Mediterranean.

I now return to Major Hussey's letter. Major Hussey went on to say: "The most important service which the pigeons will have to render is to provide a speedy and certain means of communication between Tangier and Gibraltar, distance 30 miles. Homing pigeons will be of immense convenience to Officers and others shooting in the wilds of Spain, where there is not any postal service, and where roads scarcely exist. Possibly homing pigeons would be a very great convenience to the Fleet. In all these cases I think a maximum of 70 miles flight would suffice." Then he asks me to obtain these birds for him, and I hope to be able to put him in the right direction. Major Hussey's letter is, as you see, essentially practical.

The history of the pigeon post and its organization was dealt with by Major Allatt in his lecture, and is so generally understood that I do not think I need say much about it. Of course, as you are aware, the first great organization of pigeon post was at the siege of Paris. I would call your attention for a few moments to some of the very interesting documents and papers that I have before me, which I think have never been exhibited in public. During the siege of Paris a number of pigeons were sent out by balloons. Here is the volume "En Ballon," which contains the whole account of the balloon service which went out of Paris during the siege. You will find that about 300 pigeons were sent out. Of the balloons two or three were lost at sea. Some fell into the hands of the Prussians, others descended on neutral ground and on French ground. The pigeons were then, in the first instance, taken back to Tours, and their messages were attached to them, and the liberated pigeons went into Paris. I have here two of the original telegrams that were sent back. They are not, as was subsequently the case, micro-photographed on collodion films, but were written and photographed on paper; if you will look at this despatch you will see a number of letters written in ordinary handwriting, and also despatches from the Ambassador in Brussels to the French Government. These latter were written in cipher, and all in

numbers, so that they appeared something in this way—9, 27, 18, 4, 7, and so on. What all this meant, of course, no one knew except those who had the key to the cipher. Here, again, is a letter which you will see has on it the postage stamp of the French Republic: it is also stamped, "*En ballon monté.*" That letter was found in the middle of the English Channel. Two or three of the balloons disappeared, no one knew where. You hear of their loss, but where they went, and where the men went, no one knows. Some of these balloons passed down the Channel, when the aeronauts tied up the mouths of their post-bags, and threw them over, and some of them were taken up by fishing boats. Here is a letter sent out of Paris, "*en ballon monté*," and directed to a lady in London. It is from her son, who was in Paris at the time. He was a thorough Frenchman at heart, and the way in which the boy speaks of the work he has got to go through, and how he has to run off to the front at the sound of the bugle, makes the pulse beat faster to read. I have here also the later development of the Paris pigeon post. Here is one of the documents which were issued by our own Postmaster-General; it is headed: "Open letters for Paris, transmission by carrier pigeon. The Director of the French post-office has informed me that a special despatch by means of pigeon correspondence, addressed to Paris, has been established at Tours, and may be made use of for brief letters." It goes on to say every letter must be posted open, that it must not consist of more than twenty words; that no figures may be used; that the number of the house must be given in words; that combined words may not be used; the letters must be written in French in clear intelligible language; that they must relate solely to private affairs; and no political allusions will be admitted. The charge for the letter is 5*d.* a word, and 6*d.* for the registration of the letter. The date of the document is 16th November, 1870. Those are the conditions. Here is one of the envelopes in which the letters, when received by our post-office, were despatched to Tours. Here is what you may call a way-bill—a sheet containing the number and destination of the letters. These letters were sent over to Tours; were set up in type, and micro-photographed on collodion films. This little film, half an inch square, contains three columns of print, in which are reproduced 200 letters, each of twenty words, the postage paid on it was 40*l.* Sixteen of these were photographed together on a film of collodion so thin that as you breathe on it it curls up with the mere moisture of the breath, and practically possesses no weight. The weight of 40*l.* worth of letters is one-eighth of a grain, that is to say, forty of these sheets are equal to the weight of a single pea. I need not tell you that a pigeon would not be incommoded in carrying them.

As other examples of the practical work done, I may state that I have despatched five large flights of pigeons over to Brussels: two from the Crystal Palace, two from the Alexandra Park, and one from Northumberland Street, Strand, and in all those cases the birds went very well. At the present time there are homing or racing pigeon clubs in nearly every considerable town in the kingdom. These

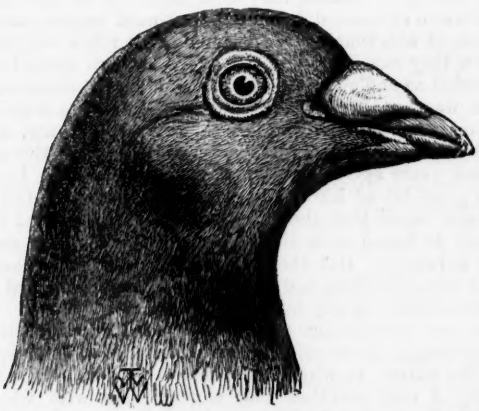
really owe a great deal of their success to the energy that the present member for Market Harboro', Mr. Logan, threw into the pursuit. He spent a large amount of money and a great deal of trouble, and got together a large number of amateurs, who flew from Rennes, Cherbourg, and various places in France with very great success. This printed sheet shows the work of the United Counties Flying Club for the year 1883. The document is interesting, inasmuch as it gives the average velocity at which these races were effected. For example, from Granville, where the first, second, and third prizes were won by Major Colville, the velocity was 935 yards a minute. At Rennes, Mr. Logan and Major Colville divided the first and second prizes; the velocity was 1,100 yards a minute. From Cherbourg, across 60 miles of water, the wind being unfavourable, the velocity was only 800 yards per minute. In another race from Cherbourg the velocity was 992 yards per minute. These races show how successful the work is.

Having called attention to these matters, I think it will be worth while to speak of the practical management of a loft, which was not touched upon by Major Allatt or by Captain Aston in their lectures. The greatest mistakes were in the first instance made by those who established lofts of homing pigeons for military service. I have here an illustration showing, perhaps, one of the mistakes. After the Franco-German War a distinct pigeon organization was established in Paris; and in the *Jardin d'Acclimatation* you will see this building that was erected as a pigeon loft. No one who knew anything about homing pigeons would have built a place of this kind for their reception. All that a homing pigeon requires is a loft, or room of a size proportionate to the number of birds flown. It is perfectly useless to keep homing pigeons in what are popularly known as pigeon-houses on poles, or against the walls of houses. A room is required with shelves divided by upright partitions 2 or $2\frac{1}{2}$ feet apart. These divisions should be open in the centre, and at each end of the shelf should be placed a pigeon-pan made of earthenware for the eggs to be laid in, and the young to be hatched. I am convinced that twice as many birds, and much stronger birds, can be hatched by the use of nest-pans, because the birds are kept dry, warm, and clean by their use. They must be supplied with a sufficient amount of salt and grit.

There is no doubt whatever that the homing faculty in pigeons is hereditary. It has been intensified by careful selection, as the best birds are retained, and all the worst are lost in the system of training which is adopted. You must therefore begin with good birds. The only birds to be depended upon are those whose parents have been trained generation after generation, in which the homing instinct has been intensified.

All the best homing birds were originally obtained from Belgium. The word "carrier" is an unfortunate misnomer, because it has been applied to an English fancy bird, incapable of prolonged flight. "Carriers" are fancy birds with large wattles round their eyes and over their beaks. A good Belgian bird has the muscles of the wing

and chest well developed; the feathers of the wing are exceedingly broad, so that when it is extended there are no interstices between them; the feathers of the wing are not spread out like fingers, but each one overlaps and is overlapped by the others, so as to make a good resisting surface with which to strike the air. The pectoral muscles that move the wing must be very large and well developed. The keel must be perfectly straight and very deep, so that there is a good deal of flesh upon the breast of a homing pigeon. Then the back of the skull, where the brain is situated, is large and rounded. The skull itself possesses considerable breadth. The bird must have a certain amount of observation and intelligence, as well as these muscular qualities which enable it to fly long distances. Now these qualities, as I have mentioned, are hereditary, and no one who wishes to establish a loft should do anything but get birds from a reliable fancier who is flying his birds long distances.



Accurate portrait of homing pigeon formerly in the possession of the author.

I do not see any difficulty whatever in establishing a loft of birds in any position that may be required for military purposes. Neither cold nor heat affects the birds. The *Columba livia*, from which these birds are descended, is a native of all parts of the world, except in the very coldest: it is found in India, Egypt, and in most parts of Europe. It can adapt itself to any part of the world, and therefore there is no doubt that its descendants may be reared everywhere. But if a pigeon loft is established, it must be done with some degree of intelligence, and it must be done by persons who really, as I have said before, have a liking for pigeons, and will interest themselves in the matter, and train them properly. I have been concerned in two or three successful, and in some very unsuccessful, attempts to establish lofts of pigeons. One of the most

successful was when the editor of a Colombo paper gave up his loft of pigeons on the establishment of the electric telegraph from Point de Galle to Colombo. The electric telegraph was worked by the natives, and he found it was not reliable, so he applied to me for some more birds to re-establish his loft. Point de Galle is 70 miles from Colombo, a very long flight, rather too long to work the birds on a post, but still there was the coast line to fly by, and the birds did it very well. I have also had unsuccessful attempts, of which I think it is right to tell you. One of those was connected with Trinity House. The Trinity House applied to me on the occasion of the wreck of a German ship off the Sunk Lighthouse to establish communication between the floating lightships and Harwich. They did not ask me what they should do, but they told me what they wanted done. I said, "I do not think it will answer, but I will give you all the assistance I can." A loft was established in the old lighthouse at Harwich, and a number of young birds were raised there. When they were well trained, they were taken out to the lightships. The birds were so exhausted from the continual motion, after being kept a month at sea, that the experiment was not a very successful one. I know they saved one ship and one or two lives, but it was hardly regarded as sufficiently successful, and it was eventually given up. There was another unsuccessful experiment in which I have also been engaged. I speak of these failures, because, after all, failures are more instructive than successes. It was the supply of pigeons some years ago to some of the forts in India. I sent out a remarkably good lot of birds, and wrote out some very full instructions. I have heard that the birds were so mismanaged that they were allowed to breed with the wild pigeons, when the result was necessarily a failure. But there is not the slightest reason why it should have been a failure, had the pigeons been consigned into the hands of persons taking any interest in the matter.

There are one or two other points to which I should like to draw attention, although, perhaps, they are rather matters of detail. To show you the extent to which the pigeons may be utilized, even in this country, I may mention that a gentleman with whom I am acquainted is in the habit of having his daily paper brought to him from a town, five miles off, by pigeons. A page of a daily paper, weighing $\frac{3}{4}$ of an ounce, is rolled up tightly, and put round the neck of the bird, which is then liberated. It is rather a severe task for a pigeon, and would not answer for more than a short distance. Of course, in using pigeons for military or express purposes, this would not be attempted; but it will show you one mode by which pigeons can be made available.

There is another point to which I would like to call attention. Amongst the foolish statements that have been made in many of the pigeon books is one that, as the pigeons might be pursued by falcons, the plan used by the Chinese should be adopted of tying whistles to their tails to frighten away the falcons. In the book of Mons. Pierre de Roo, we have a drawing of a pigeon with these whistles attached to its tail. It is true the Chinese put them on, and

I have put them on. I have had half-a-dozen pigeons careering round my place with these instruments attached to them. Some of these whistles are very complicated: the remarkable fact about them is their excessive lightness. They are made of bamboo, cleared out to the most extreme tenuity; others are made of quill: they all make unearthly noises. But their use is a mere amusement of the Chinese, and has nothing whatever to do with the protection of the birds from falcons.

I was rather anxious to get for this lecture some information as to the work of the Admiralty in founding pigeon posts at the seaports, but it was regarded as being matter in progress that should not be discussed at the present time. I am, therefore, not able to give any definite information beyond the fact that the Admiralty, as is shown by Captain Allatt's letter, and also by that of Major Hussey, is experimenting on the subject; but it is not thought desirable to give any further information at present.

Major ALLATT (Duke of Cornwall's Light Infantry): I should like to make a few observations upon what Mr. Tegetmeier has said. I am a practical pigeon flyer myself, so that I am quite in sympathy with all the remarks he has made. I am glad he has made some allusion to the management of a loft of pigeons, because it is very important, and in the other lectures which have been delivered here, no attempt has been made to give any information on that point. If people imagine that they are going to get a lot of homing pigeons, even of the very best breed, descended from birds that have done the very best work, let them live in a loft and train them successfully, without having what I may call a considerable amount of technical knowledge in their management and in the system of training them, they will find themselves disappointed in the results obtained. Homing pigeons require a great deal of attention, they require the expenditure of a lot of patience, and, I may say, a good deal of money, if they are to be trained to fly any distance. I will give you one example. Pigeons are only fit to fly long distances when they are in good condition, and they are not always in good condition. The time for flying pigeons, of course, is in the summer and autumn, when there is a fair prospect of fine weather. That time is the breeding season. The hens lay eggs and the young ones hatch out. When the eggs are laid, the hen is not fit to fly; she is not fit to fly just before laying nor just afterwards. Neither the cock nor the hen is fit to fly for some days after the young ones are hatched. The cock and hen take it by turns to sit upon the eggs. The hen sits all night and most of the day. The cock sits six or seven hours in the day, but the hen takes the rest of the work. When the young ones are hatched, the cock and hen both feed them at first with soft food, which is contained in the crop,—no doubt the origin of the term "pigeon's milk." That soft food secretes itself in the crop of the parents, and, if it is not given to the young, becomes sour and the old birds become ill. If, therefore, pigeons are sent for a long fly soon after having hatched out their eggs, you cannot expect them to return home. That is one of the many details which have to be attended to in pigeon flying. I am saying this because I do not want people to imagine that successful pigeon flying is a thing so very simple to accomplish. When I was at Sandhurst some years ago I kept a loft of birds there. I attended to them myself and devoted a great deal of time to them, and I got very excellent results. I now keep a loft of birds at Dover. They are looked after by a boy, but I can get no really good work out of them, at least nothing compared to what they formerly did. The birds are of the same breed, of the best flying strain, they could not be better, but the fact is, simply, that they do not get the care and attention that they demand, and I am seldom there to look after them myself. The large map before us gives the lines of flight, and the small map which Mr. Tegetmeier has handed round also gives the principal lines of flight adopted by the

Continental nations, under the auspices of the War Ministers. These lines, you will observe, are mostly across dry land, few are across water. Now, in England many of our lines of flight, that is to say, the directions which have been adhered to by some of our private pigeon-flying societies, have been across water. For instance, some of their races are, or have been, from the Isle of Wight and from Cherbourg, and from other parts of France. From the Isle of Wight to Cherbourg is a distance of from 60 to 65 miles. The birds are tossed at Ventnor, and then, perhaps, ten days afterwards, are sent to Cherbourg to race from there. Now, I take it that if pigeons are required for use in England from a Government point of view, it will be for naval purposes. If they are used for naval purposes they will have to fly across some extent of sea. I will give you the result of my own experience of pigeons flying across the English Channel where it is over 60 miles in breadth. In 1886 the London Columbarian Society flew a race from Cherbourg. There were 148 birds liberated. The velocity of the winning bird was 1,370 yards a minute. There were fourteen prizes, and the fourteenth bird made 1,192 yards a minute, so that you will see that between 1,192 and 1,370 were the winning velocities in yards per minute, made over a course of some 140 miles, 60 of which was over water. Some of the birds had to fly to London and others to different parts of England. They nearly all homed. I sent seventeen birds and they all homed; one of them, a little hen, winning first prize. It was a lovely day, the atmosphere was perfectly clear, and there was a light breeze, favourable to the birds. We may assume, then, that a similarly successful result would ensue if good birds were let out under favourable atmospheric conditions from ships in the Channel to fly over about 65 miles of water, provided, of course, they were in good flying trim. On the 28th June, 1887, the London Columbarian Society flew a race from Dol, in France, over 200 miles from London. It was a most disastrous race. The weather was fine at Dol when the birds were liberated, but there was a thick mist in the Channel. I remember waiting for my birds, and looking out into the distance. I could not see more than about three miles. Bear in mind what those birds had to contend with. They had, first of all, to fly over nearly 100 miles of French territory to Cherbourg; then there was a broad expanse of sea in front of them: they could not see across the Channel, they could look into the mist, that was all. The pluckiest birds went straight on and landed safely somewhere on our coast; but out of 126 birds liberated only 7 got home the same day; that will show you the effect of weather in pigeon flying, and only 18 birds were reported home altogether. No doubt many were lost and drowned in the Channel. I sent 8 birds and got 4 back, and that was a good deal more than the average. You must not, therefore, imagine that pigeons are suitable for flying in all weathers. Sometimes, of course, the weather is undoubtedly too bad for any land birds to fly in at all. Sometimes one has to decide if this is the case or whether it is only just sufficiently bad to give a fair prospect of their reaching home, and, of course, knowledge of this sort is very valuable to persons who use birds as message bearers on important occasions. It is no use attempting to use a bird unless there is a fair chance of its homing. I might also mention another race which was attended with a curious and rather instructive result. The birds were let out in the Isle of Wight, and directly they had been liberated a gunboat began firing in the Sound. The birds flew round up to the gunboat; it fired again and they circled back again. They did the same thing several times, refusing to face the noise and smoke, and at last the majority of them settled somewhere in the Isle of Wight. At that time my pigeons at Sandhurst lived close to the saluting battery, and they were accustomed to sit on the top of the loft when the guns were being fired. I sent ten birds for that race, and they all came home in good time, six of them making a velocity of 663 yards a minute. There were no other birds but mine that made a higher velocity than 360. This shows that in training birds for use in war one of the things that have to be considered is that, for naval purposes, it would be as well to train them to fly over guns that are firing. I mention that as a case that should not be lost sight of. With reference to the probability of our naval authorities taking up the matter, I hope there is someone here to represent the Intelligence Department of the Admiralty. I know nothing about the intentions of the Admiralty beyond having received, as President of the Dover Pigeon

Flying Club, a communication from the Intelligence Department of the Admiralty in October last, asking the number of people belonging to the club who owned homing pigeons, the number of birds trained and other information. From this I think we may hope that our Admiralty are going to take the matter up. I am quite sure that for Channel service, and for service within a moderate distance of the English coast, homing pigeons, or birds of some sort, as message bearers, might be an exceedingly valuable adjunct to any English naval force. If you want to send a message to the shore, instead of sending a gunboat or other ship you let out your pigeons which are on board, and, if the weather is pretty good, there is a fair chance of the birds reaching home. You can go on using your pigeons, sending message after message. No doubt birds are exceedingly useful for naval purposes of that sort. The Italians use them very considerably in the Mediterranean in connection with their ships of war. The French also use them regularly and systematically in the Mediterranean during their naval manœuvres, so I do not see any reason why they should not be used in this country with advantage in a similar manner. I am glad that Mr. Tegetmeier made an observation as to the value of these homing pigeons, because it shows you the difficulty of getting together a lot of birds that have done really good work. When Mr. Logan's birds were sold in 1886, seventy of them fetched 670*l.*, or an average of 9*l.* 13*s.* 6*d.* apiece. That gives you an idea of the value of an exceptionally good pigeon, and it also indicates the many difficulties that have to be overcome before a good loft of workers can be established. I was reading the other day an extract from an old magazine which referred to other birds having been used as message bearers. We know that the swallow, the raven, and even the duck has been used for this purpose. We know that the eggs of wild ducks can be hatched out under tame ones, and that the young ones become perfectly tame. I can vouch for this from personal knowledge. In the paper I was reading there was an account of some ducks having been trained to fly a considerable distance. It appears to me if we are going to use birds to fly over water for naval purposes ducks would be better than pigeons, because, when the duck gets tired, he drops and sits on the water until he is rested, and then goes on again. Ducks have the further advantage of being able to fly at night, which pigeons cannot do. I really do not see why they could not be used as message bearers, but I do not know how far they would fly. There is another bird which it occurred to me might possibly be made use of, and that is the sea-gull. With this idea in my mind I once tried to "home" some young gulls. I got three little gulls about a month old; they were like little balls of yellow fluff. I kept them at Dover in a garden, and I allowed them when they were old enough to fly about. One of them came to grief very soon, and there were two left. These two birds used to fly with the pigeons, they became perfectly tame, would perch on the top of the house, and come down into the garden to be fed. One of them mysteriously disappeared, but the last remained altogether about six months, and then he disappeared also; whether he went away or got shot I do not know. Unfortunately I was not able to carry out the experiment thoroughly as I was so often away, but from what I saw it struck me as quite possible that gulls might be trained for message-bearing purposes, and I think ducks also. Mr. Tegetmeier has of course an amount of knowledge on these matters that I have not. He has stated that French birds have not been trained to fly across the water. In this he is misinformed. I happen to know that both in 1889 and 1890, a French pigeon society of Douvres, in Calvados, flew their birds from Plymouth, and that in one of these races at least the French Minister of War gave prizes, so that you see the French are apparantly paying some attention to Channel work with pigeons. Paris pigeons are and have been frequently flown from Dover, and I believe from London. With regard to the Indian homing pigeons, I have had tidings of them. I have been told that they have crossed with the native blue rocks. Of course this would not improve their homing instinct. I am also informed than when a regiment arrives where the pigeon station is, they have to tell off an Officer to look after the pigeons. It is a paid appointment, and he gets so many rupees a month. He has to be a Subaltern, so naturally the senior Subaltern is always told off to look after the pigeons, quite irrespective of his knowledge. What has been the result? A lot of pigeons are occasionally put into a basket, and sent out about 20

miles. Some come back and some do not. It was not exactly known which came back and which did not, but a week afterwards there were five or six less birds, so that it was presumed some had been lost. Of course it is quite impossible to carry out pigeon-flying under such circumstances. The training of homers is simple enough, but it does require a good deal of care, experience, and technical knowledge.

Admiral LONG: I must first guard myself by observing that I have no mission from the Admiralty to say a single word here, and I know nothing whatever about what the Admiralty are doing. I only rose because I was formerly very much indebted to Mr. Tegetmeier for his kindness in giving me a little instruction about the matter some three years ago, and I am also glad to express my thanks again to Major Allatt for his kindness in supplying me with pigeons. When I was at Pembroke Dock I was rather taken with the idea of flying pigeons. At that time the Intelligence Department of the Admiralty were talking about it, and we got those pigeons. The Admiralty fitted up the loft according to Mr. Tegetmeier's drawings. I think we had a dozen to begin with. We bought them from two different places. I think I gave 30*s.* apiece for four of them, and Major Allatt gave me some. I lost two or three of them, but they became very numerous indeed. Where I failed was I had not the means of training them properly. I used to send them out whenever the tug went out, but that was not often enough. On one occasion we sent seventeen birds out in the Waterford boat, with instructions to liberate them off the Smalls, about twenty miles out in a straight line. It was a fine morning, and ten of them came back, but seven did not. Whether they were all liberated I had no means of knowing. On another occasion we took a lot out in the "Pearl." It was a very hazy day, and, as I was a good deal occupied with the steam trial, I really forgot to let them go till we were a goodish way off the land. I could see land perfectly well myself, but the pigeons might perhaps have experienced what Mr. Tegetmeier says, they had got rolled about a good deal, and, perhaps, did not feel very happy. They rose in the air, but on that occasion I think I liberated about twenty-five, and I never saw seventeen of them again. In spite of all this, the pigeons increased so largely that we were obliged to kill and eat them in order to keep them down; and, I am sorry to say, I believe that is the principal use that is now made of them; but it is a great pity. If there were only a torpedo-boat or the means of sending them out and training them, I believe they could be trained. But we must understand that the use of these birds at sea in England must be very limited. The weather, especially at a place like Pembroke Dock, is very often so very thick, I do not think the pigeons could make much of it, but still if birds were trained to sea-work they might possibly improve very much. But I think they would be exceedingly useful in war-time from cruisers; and we must not forget that there are many parts of the world where the climate is much more favourable for using pigeons than in England. Our ships are in all parts of the world, and there are certainly many places where it would be very useful indeed to establish a pigeon loft, and be able to use them from ships. It requires to be undertaken systematically, and I think it is now undertaken at Portsmouth, where there are always boats going out of the harbour, so that there is no difficulty about sending them out, and I believe they are having very good success with them, so far as I have heard.

Captain W. ST. JOHN HORNBY: I would like to say a few words on this very interesting lecture, as I claim myself to be a very old hand with pigeons in a practical way. As I have previously stated in this theatre I kept pigeons as a boy, and before I went to sea in 1850 I used to train pigeons, and I flew at that time what was considered a very long distance, twenty miles. When I have been paid off from ships I have always had birds. In 1871 I first had the pleasure of making Mr. Tegetmeier's acquaintance. I was then living in the country, and I had some very good Belgian homers from him, and that strain of birds did good work in 1871–72–73. In 1883, having for some time lived in London, I again started a pigeon loft, and I had one of the nicest, if not the best private, lofts at the West End. I never, for various reasons which I need not trouble you with, took part in the large pigeon clubs and long distance races, but flew my birds myself, from Boulogne and Belgium, mostly through the instrumentality and good offices of the late Mr. Ledger, who had, in connection with the South Eastern

Railway, the opportunity of sending birds across the Channel by steamer. I had one bird that came over during a very thick fog in the Channel, from Boulogne, and at the time when the bird appeared in my loft the guns at Folkestone were signalling to the steamer which was coming across on account of the thick fog. My pigeon had flown *over* the fog. We must all congratulate ourselves on hearing such a very interesting lecture from Mr. Tegetmeier, who is, unquestionably, the veteran pigeon fancier of England, and has been connected with the "Field" newspaper as naturalist for many years. It is principally through his writings and by the publication of his interesting little work, I think in 1871, or so, on the Belgian homing pigeon, that the introduction of Belgian pigeons into this country has been effected. Previously to that time the pigeons used for flying races in this country were all, more or less, what are called skinnums, dragons, or long-faced beards, and other birds of that type. It is through Mr. Tegetmeier's writings, and especially after the 1870 Franco-German War, that the pastime of "pigeon flying," on the Belgian system, has been so largely introduced into this country. The first success in getting the pigeons "across the water," *i.e.*, the Channel, was due to the energy of Mr. Lubbock and the late Mr. Ledger, and, I believe, also, of Mr. Tegetmeier himself. After that, the establishment of large pigeon-flying clubs, like the United Counties Flying Club, was due to Mr. John Logan, who organized and carried it out on a much more systematic basis than had ever previously been done; and from that date other clubs have been started on similar lines. The "London Columbarian," of which Mr. John Day is secretary, has been the most successful club, I suppose, that has ever been established. These clubs fly their birds during the racing season, 200, 300, and 400 miles. In Brussels every week during the racing season birds are flown 200, 300, 400, 500 miles, and in July last there was a race for 590 miles from St. Jean de Luz to Brussels. The winning bird did the distance (about 590 English miles) in 16 hours, or at the rate of about 38 miles an hour. I ought to mention that the winning bird arrived at its own loft the evening of the same day that it was tossed at Louvain, a town some few miles from Brussels. From the map you will see the great strides which have been made by the military Powers of the Continent in establishing lofts, and if such is the case, and upon which there is no doubt, I do not see why correspondence by means of pigeons, and the development of pigeon lofts should not be carried out by the Naval and Military authorities in this country, because, if the thing should be considered useless for that purpose, the sooner it is dropped the better, but if, as is shown by the use of pigeons during the siege of Paris, and the adoption of them by all the military Powers on the Continent since the Franco-German War, it demonstrates, I assert, the great value and usefulness of the pigeon for war purposes, and if we do not follow their example, I think a serious injury is being done to the naval and military forces of this country by not putting them in a more perfect state for defence. No doubt, for naval purposes, the flying over the water is, or rather *was*, the great difficulty with pigeons, but the problem has been solved by the Italians. As an example: they have a military pigeon loft at Rome, and another at the island of Maddalena, and the birds belonging to them alternately fly from one loft to the other in very good time. The total distance is 170 miles, and of that the water is 150 miles. The pigeons did that on several occasions at the rate of 28, 29, and 30 miles an hour. A longer distance by sea has also been done by them. They have another military pigeon loft at Cagliari, and they practise on what is called the Cagliari-Napoli line. The distance between those two places is 294 miles. They throw the birds from ships, and they have done a distance of as much as 287 miles over the sea at about 31 miles an hour. I think if our Government would take the matter in hand and help, a system might be very well established in this country. It might be done in two ways: either by the Government itself taking it in hand and establishing pigeon lofts, say, to begin with, at the principal ports, Plymouth, Portsmouth, Portland, Harwich, and so on. The distance from Cherbourg to Portland is but 60 miles, and from Cherbourg to Portsmouth but 74 miles, which distances, considering what the Belgian and Italian birds have done, the former over the land, the latter over the sea, is a mere trifle. I think, however that a better system, speaking from a naval point of view, would be for the Admiralty to help the well-established

clubs, say, the London Columbarian, the United Counties, the London Flying Club, and some good club, say at Manchester, Preston, and so on, by subsidies in the way of prizes. It would be far less expense, and the management would be still in the hands of those who are thoroughly *au fait* on the breeding and training of pigeons. It would not be a great expense, and it would be a great inducement to pigeon fanciers to develop their birds, in order to win the prizes. I think that as this principle of a subsidy has been already adopted in the case of the Mercantile Marine in order to keep certain ships ready for the Navy in case of war, it might also very well be adopted in some small degree towards helping a system of correspondence by means of pigeons. It would cost very little, say 50*l.* or 100*l.* per annum to each of these clubs. In return for such subsidy the Government would have the right to call upon each club for the use of its pigeons in case of war, and the whole apparatus could, if necessary, be placed under the control of the Government so long as the war lasted.

Lieut.-Colonel R. HENNELL, D.S.O.: Reference has been made to the failure of birds in India. A perusal of Mr. Tegetmeier's book and my interest as an Indian Officer led me to purchase two pairs of the finest breed in 1867. I took them out to India, by the Suez Canal, to make the experiment, but I had to land for duty at Aden. I followed all the advice given by Mr. Tegetmeier in my care of these pigeons. I was detained for a year at Aden, but during that time neither of these pairs of birds bred. I had during this time to take my turn of duty at the island of Perim, 90 miles off Aden, and I took one pair of birds there in the hope that they might breed. But they did not, and, therefore, I could make no experiments in establishing a pigeon post, as I hoped I might have done. I afterwards proceeded to India, and for some months the birds would not breed. I then purchased some of the best birds from the native fanciers. They have all kinds of birds in India, where they train them for racing purposes, for play, and all kinds of diversions. The pigeons I purchased were said to be good racing birds. I immediately got some results, as the birds began to breed freely, but, I am sorry to say, before I could train the young I was obliged to leave India, and my birds were handed over to a friend. I only make these remarks because it was strange that the English pigeons which were prize birds should not have bred in a climate where it was supposed that they would have done so. It is a curious fact they would not breed in India, and it was only when they were crossed with the native breed that they began to do so. In the year 1881, when the Government of India took up the subject of homing pigeons for military purposes, I was deputed to draw up a scheme for the introduction of carrier pigeons. I believe there were thirty-six pairs went out. They were tested in many ways. They were cared for by good men, though perhaps not in all instances, but I believe they have not altogether succeeded. There are a great number of kites and hawks in India, and it is believed a great number of the losses occur from these sources. There is no doubt about it that the homing instinct seems to disappear with cross-breeding. India is the land of pigeons; they are everywhere; training, therefore, is difficult. The great point is whether, if you breed in India, you can keep to the pure English homing pigeons, and keep them quite separate from the native or indigenous race, and in this manner not only keep up the homing instinct but improve it.

Admiral Sir R. VESEY HAMILTON: I should like to say a few words, though I do not think what I am going to say will lead to any discussion. I commanded the "Hydra" on the coast of Africa, in 1858 and 1859. We had a number of pigeons on board, the idea being to make pigeon pie. These birds were on board ship nearly three years on the coast of Africa, English Channel, West Indies, and Labrador, and were constantly flying about. They would go away two or three miles and come back again. I only mention this to show that pigeons can be kept on board ship in all latitudes, below 55° F., in all climates, and in all weathers. The only other question I should like to ask is what is the greatest distance pigeons have ever been known to fly? In the year 1850, Sir John Ross went to the Arctic regions and took four pigeons, one of which is supposed to have reached home; but I should like to have a little confirmation on that point.

Mr. TEGETMEIER: With your permission, I will make two or three very brief remarks in reply. The most important subject as far as regards my answer is that

which was alluded to by Major Allatt, viz., the use of other birds for flight. I regard that practically as entirely out of the question. Taking the case of ducks, wild ducks are migratory: they spend one part of the year in one district and one part in another, and you can hardly expect to locate them or to use them in the same way that we can homing pigeons. In the first place, you could not get them to go into a loft or into their house. Even if they were not migratory, I do not think they could be utilized in the same way as pigeons. Nor could we get gulls or any other birds that I am acquainted with so far attached to their homes as to be at all serviceable. The pigeon is one of those few animals—there are only about forty in existence—that are domesticated. We can readily tame individual animals, we can tame an individual pheasant which will fly at us and fight us occasionally, but to make pheasants, as a rule, attached to a house, is impossible. Domesticated birds, those that are really homers, are very few indeed. With regard to birds flying in a fog, I may state that very often they will fly over a fog. On the last occasion on which I liberated a flight of birds to go to Brussels, I let 300 birds off within 200 yards of this place. They were to have been liberated at six o'clock in the morning or earlier, but the weather was so very thick here, I refused to liberate them. They were kept in the paniers. At twelve o'clock the sun broke out, I liberated the birds, and they flew over what remained of the fog, and got back to Brussels in very fair time indeed. The race was over 200 miles, and it was accomplished in one day, not, however, by as large a number of the birds as would have been the case if they had been liberated early in the morning. In these long-distance flights the Belgians always endeavour to liberate the birds very early, four or five o'clock A.M. in the middle of summer. Their great objection to sending over birds here for flying matches to be witnessed by the public at large, is, that they do not like them being liberated as late even as twelve o'clock. With regard to the support of the clubs by the Government, as mentioned by Captain Hornby, I think it would be exceedingly important to give small prizes and subsidies to clubs at the seaports. We had, as was remarked by Captain Hornby, an exceedingly energetic pigeon-flyer and fancier connected with the export service at Folkestone, Mr. Ledger. If that club, which had very good members, had had a small subsidy, or had a few pounds been given by the Government each year, it would have been in existence now, and, no doubt, would have had many hundred good birds at the service of the Government. They would all have been managed by men who knew perfectly what their management should be. I am quite confident that good clubs of this kind, where men would keep their birds in the best possible condition to win the races, could be much better managed privately than they would by persons who were not personally and specially interested in them. The long distances mentioned, I think, are exceedingly undesirable. What is required practically in pigeon-flying is, not birds that could fly 200 or 300 miles, but birds that can be depended on with certainty to fly 70 or 80 miles. Practically, 100 miles would be greatly in excess of any real or useful requirement. Some of the distances on this map are far greater than any pigeon fancier would endeavour to establish a relay of birds. Before the establishment of the electric telegraph, it is very well known that the Rothschilds and the stockbrokers had relays of birds on the Continent: all the stock-jobbing was regulated by pigeon express. It is said the news of the battle of Waterloo arrived in England by pigeon express, and was communicated by the Rothschilds to the Government. This was accomplished by stages, so as to make quite certain that the birds would do the distance. There was no flight from Paris to London, but the message was brought by short stages, and transferred from one bird to the other. I was asked what is the longest flight? I believe the greatest distance pigeons have flown of which we have any accurate record, is in the races which have taken place two or three times from Rome to Belgium, a distance (the way in which the birds fly) of between 800 and 900 miles. But in every one of these cases a very large proportion of birds have been lost, although only old and very experienced birds have been employed. The statement about pigeons being sent out and returning from the Arctic regions, that was published in "Yarrell's British Birds," was perfectly imaginary, and was at my suggestion expunged from the last edition. I have here an account of a bird flying 1,500 miles

in America. This appeared in an American paper, and Professor Spencer Baird, of the Smithsonian Institute, wrote to me and asked me if it was possible that such a thing could be true. I wrote to him at the time, and told him that it was a fictitious account.

The CHAIRMAN: I am sure all who are here present will empower me to offer a very sincere vote of thanks to Mr. Tegetmeier for his very interesting lecture, and for his kindness in coming here to inform us on a subject which we all hope will grow into importance hereafter.

Friday, March 18, 1892.

CAPTAIN W. J. L. WHARTON, R.N., F.R.S., Hydrographer to the Admiralty, in the Chair.

ATLANTIC WEATHER AND ITS CONNECTION WITH BRITISH WEATHER.

By ROBERT H. SCOTT, M.A., F.R.S., Secretary, Meteorological Office.

WHEN I first had the honour of lecturing in this theatre, nearly twenty-three years ago, my subject was "Storms in the British Islands, and Telegraphic Weather Intelligence," and if, in 1869, any one had ventured to predict that within twenty years meteorologists would have been able to trace a storm from the Western Pacific Ocean, across America and the Atlantic, to our own coasts, it would have been set down as an impossibility. Yet this has actually been done, at least with considerable certainty, in the case of a storm which reached our shores October 24, 1882. The possibility of carrying out such a train of reasoning is due to the existence, in 1882, of the daily charts, showing the conditions of weather over a great part of the Northern Hemisphere, which were at that time published by the Government of the United States, and by our own office. Scientific development marches fast in these days, and it is hard to realize now that in 1869 not only were there no Atlantic weather charts, but that the very weather system of the United States, "Old Probabilities" as it was irreverently called, was not in existence at all.

The broad principles which govern the weather system of the Atlantic are shown on the two diagrams I exhibit of the mean barometrical pressure, and of the regions of greatest disturbance of temperature, on the globe, in our winter.

You see from the temperature chart that, at that season, the district which is relatively the warmest is near Iceland, and from the barometer chart, that close to the same region is the district where the barometer is lowest. To get at the reason of these relations we must go back to some of the first principles of modern weather knowledge.

It is a well-known physical fact that the amount of water vapour that can be suspended in the atmosphere depends on the temperature. If air is saturated with vapour, at any temperature, any attempt to force more vapour into it, without raising the temperature, must fail; while any reduction of the temperature of saturated air

condenses a portion of the contained vapour to the liquid form, producing clouds and rain.

The chief source of heat to the atmosphere is the sun, and it is this heat which enables the air to suck up the water vapour from the sea surface.

The most effective mode of lowering the temperature of air, and of restoring the suspended moisture to the earth again in the form of rain, is to cause the air to rise above the earth. We all know that it is colder on mountain tops than on the plains below, and the average rate of decrease is about 1° F. for every 300 feet.

To show what an efficient action is thus brought into play, it may be said that, if the air over the ocean near the Equator, at a temperature of about 80°, were to rise over the Andes, to a height of, say, 20,000 feet, it would sink in temperature some 70°, and the amount of moisture contained in a cubic foot of such air would fall from 11 grains to 0·8 grain, or, in other words, $\frac{12}{13}$ of the contained water vapour would come down as rain.

If then the ascent of the air causes precipitation, its descent must bring about the opposite effect, of absorption of moisture, and descending masses of air are dry, inasmuch as they are rising in temperature owing to compression, and sucking up all the moisture they can come across.

It is to this alternation of upward and downward motions in the atmosphere that our differences of weather are mainly due, and this idea, which is a recent one, has quite revolutionized the science of weather. It was formerly believed that the wetness or dryness of weather depended on the direction of the wind; but we now know that when, apparently, one of the driest of winds, the Atlantic south-east Trade, passes over the plains of Brazil and meets the Andes, it is forced to rise, and the contained moisture is squeezed out of it in the form of clouds and rain. When Mr. Whymper was among the Andes of Quito, he had to wait for days and days even to catch sight of Sara Urcu, one of the most eastern of the chain, as that was perpetually veiled in cloud coming up from the eastward.

The way in which the sun's heat acts when it reaches the surface of the earth is to heat that surface. This, in its turn, warms the air stratum resting upon it and causes it to expand. This stratum rises, like a blister, the lowest layer being most expanded and pushing up the next, and so on till the upper layers eventually slide off, producing an upper return current above.

Any upward motion, such as has been described, must give occasion for an indraught below, from regions less highly heated, in order to replace the air removed.

In fact, it has been shown that the characteristics of the summer and winter wind systems of the Spanish Peninsula are best explained by this attractive and dispersive action at converse seasons. In summer the air flows in towards Spain from the sea on the north, west, and south, and in winter it flows out from Spain to sea in all directions available.

We gather from this reasoning that relatively heated areas are

centres of attraction for the lower wind currents, are loci for eddies, for cyclonic systems; while cold regions are the positions where we find high barometric and anticyclonic wind conditions. This is what is shown on the two charts to which I have already alluded.

In order to show that this upward and downward motion produces real differences of pressure, capable of inducing air motion, we may take two mountain stations of about equal altitude, one near the Equator and the other in Latitude 39° N. The one is Antisana, among the Andes, the other Pike's Peak, in Colorado, and both stations have the elevation of about 13,300 feet. It need scarcely be said that the station at Antisana is some 6,000 feet below the top of the mountain. At both stations, observations have been taken for a long period, and the following are the mean results :—

	Antisana.	Pike's Peak.	A. above P.	P. above A.
Pressure at sea level..	29·88 in.	30·20 in.	—	0·32 in.
„ 13,300 ft..	18·55 „	18·03 „	0·52 in.	—

Accordingly, at the sea level there is a pressure of 0·3 inch in Colorado, pushing the air towards the Equator, and on top there is a pressure of half an inch, pushing the air back again from the Equator towards high latitudes.

The air, once set in motion, is modified in its course on the following principles, established by pendulum experiments. The horizontal motion of the air, in any direction, is, owing to the earth's rotation, subjected to a deviation depending on the latitude, the force being $2vw \sin\lambda$. In this v is the velocity of the wind, ω the earth's rotation, and λ the latitude.

All currents, therefore, in the N. Hemisphere, have a tendency to draw air away from the left hand side of their path, and to pile it up on the right; in other words, to make the barometer stand lower on the left-hand side of the wind's path than on the right. This is the law which holds good in cyclones and anticyclones.

To return to our upward and downward motion and its results. The counter-current, which is really the sliding off of the upper strata near the Equator, comes to the earth about the parallel of 30° N., and there produces the so-called "Calms of Cancer," the permanent Atlantic anticyclone, which shifts its position with the changes in the sun's Declination.

The anticyclone does not stretch across the ocean, but is located over the centre, or rather over the eastern part of it, and it influences the winds in its vicinity, their direction of circulation being with watch hands, viz., northerly on the African coast, easterly (the Trade wind) in the centre near the Equator, southerly along the coast of Florida, and westerly above the 30th parallel of latitude.

Over the whole Trade-wind area the weather is very constant, with few changes and, rarely, storms. The region is often said to be rainless; but this is not true, it is only one small area, south of the Canaries, which is really rainless in spring. To the south of the

Trade zone lie the tropical calms, with very light, and uncertain, winds and torrents of rain.

There the West India hurricanes are bred, for they are often fully formed when they reach the Windward Islands. They then advance north-westwards till they cross the tropic, where they recurve suddenly and move north-eastwards.

This is common to all tropical cyclones; they all move round the western edge of the anticyclone lying beyond the tropics in each ocean in which they are found.

It is, however, the more northern part of the area which interests us the most. The whole region from 40° to 70° N. is constantly visited by cyclonic depressions; in fact, you can hardly pick out a day on which there are not two or three distinct depressions existing somewhere over the area, though, perhaps, none of them attain the dignity of a storm, or are accompanied by more than a gentle breeze.

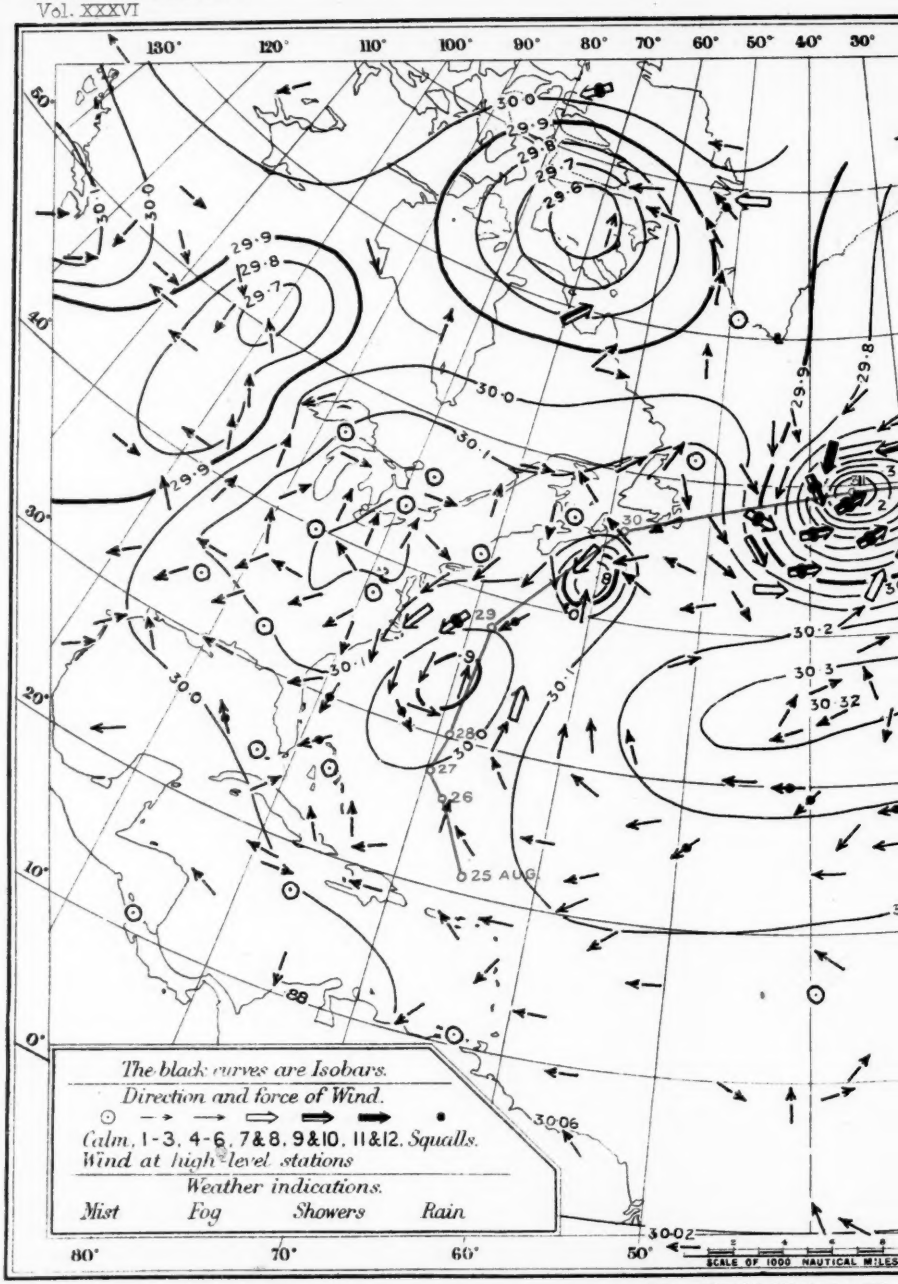
In order to throw some light on the origin and history of these depressions, and the storms which they at times bring with them, various institutions have prepared and published daily maps of the Atlantic.

The fullest of these maps that appeared were those issued by our own office; they covered the period of thirteen months, commencing with August, 1882, the interval for which the international polar stations, on the plan proposed by Lieutenant Weyprecht, were in activity. In this way the office was able to secure observations throughout the winter from Jan Mayen and Spitzbergen, as well as from other localities which usually are visited only in the whaling and sealing seasons.

The Office invited all Captains to fill up observations daily on sheets supplied to them; the scheme was most cordially supported by all British seamen and by many foreigners also. In all nearly 3,000 ships co-operated, and about 400 observations were secured for each day. This is at least ten times as many as were available for any of the similar charts published elsewhere. Some 300 land stations were also utilized, and so the resulting charts were each based on about 700 observations. Specimens of the working and also of the published charts are on the table.

One of these latter, that for August 31, 1883, is given as Plate XIX. It exhibits one very severe storm, to which I shall refer later on, with its centre on the parallel of 50°, lying between the meridians of 25° and 50° W. In addition, no less than seven other depressions are visible over the map, two of them well within the Arctic Circle. Furthermore, we see the Atlantic anticyclone, with its barometer readings of 30·3 inches and upwards, lying between 20° and 40° N. over the Sargasso Sea, and another anticyclone, less pronounced, covering the north-eastern part of the United States. The map gives a fair representation of the general condition of the Atlantic on any day. The symbols used are explained on it.

From the study of charts like these, Dr. W. Köppen, of Hamburg, has prepared the map of which a reproduction is displayed, and which



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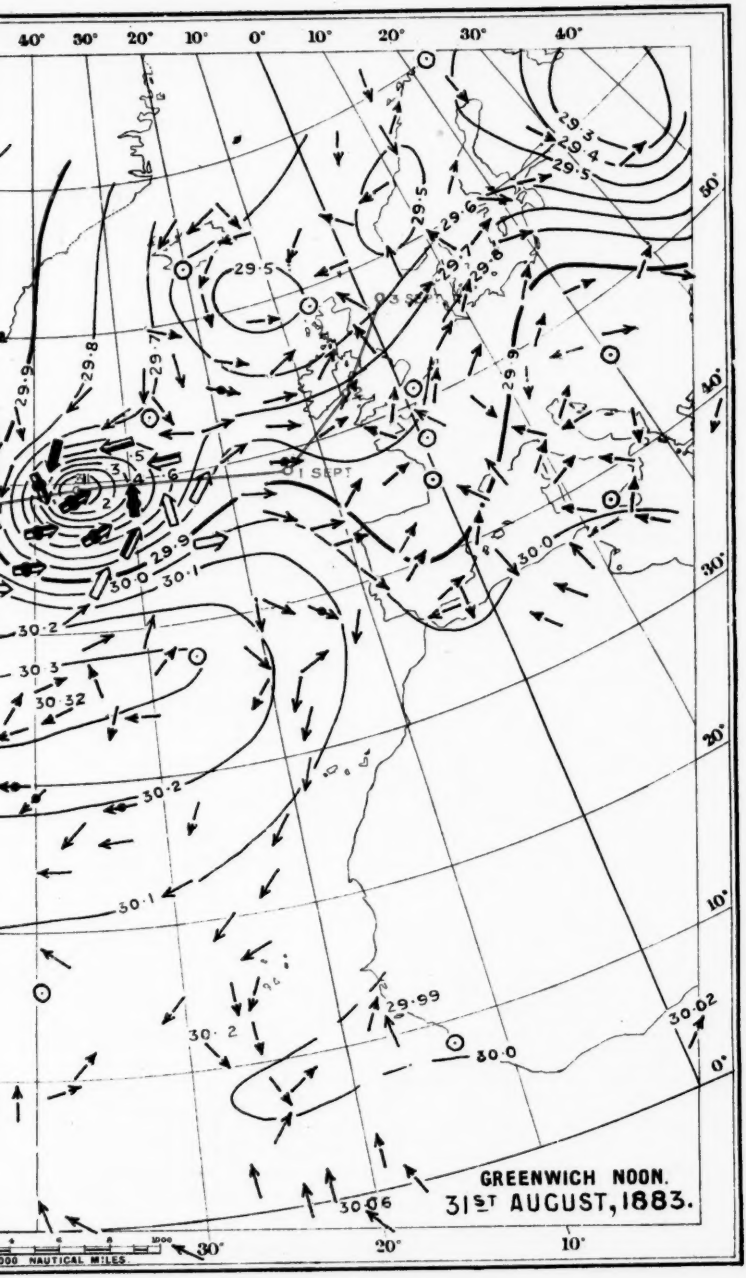

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will be found in vol. xvii of the "Zeitschrift der Oesterreichischen Meteorologischen Gesellschaft." It shows the regions of greatest frequency of depressions throughout the year. The tracks form a broad belt, covering from 40° to 50° N. over the Eastern States and out as far as Newfoundland. It then becomes narrower, and extends north-eastward until it touches the Icelandic depression, throwing out, on its way, an arm up Davis' Straits. It then passes on and forks, one maximum lying near the Loffodens, and the other over the Southern Baltic.

Our own charts are drawn for noon on each day, and this interval of twenty-four hours is too long to allow of our satisfactorily connecting the positions of the depressions seen on successive charts. Depressions at times appear of which not a trace is discoverable on the chart for noon on the previous day.

These charts have been carefully examined, and thirteen monthly maps have been drawn showing the tracks of all the several depressions which were traceable. I do not say storms, but distinctly marked areas of depression. Of these there were in all 273; but, as very few of these appeared in August, 1882, when the scheme of observation was first started, I think it best to omit that month entirely, and confine my remarks to the twelve subsequent months, when the scheme was in full activity. This reduces the number to 264, and these fall into the subjoined table:—

Duration in days ..	1	2	3	4	5	6	7	8	9	10	11	12
No. of depressions..	36	33	40	31	27	23	22	14	7	13	6	3

Duration in days...	13	14	15	16	17	18	19	20
No. of depressions..	3	2	—	1	1	1	—	1

Of these, 140, or more than half, lasted less than five days. The instances of more than ten days' duration were rare, and those of much longer duration extremely so, and entirely confined to the autumn months. One of these was the storm of October 24, 1882, to which I alluded at the beginning of the lecture, and which Mr. Harries thinks he has traced from the Philippine Islands to England, a distance of 14,000 miles.

You will see from column 1 of the table exhibited that the distribution in the successive months does not vary much.

It is now interesting to see what we have learnt about these depressions, as to where they come from and whither they go. I have shown on the table (subjoined) some figures showing the distances to which these systems travel:—

	Total depressions.	No. appearing S. of 40° Lat.	No. passing 0° Long.	No. appearing S. of 35° Lat.	No. passing 0° Long.
September ..	14	4	3	2	2
October	26	7	1	5	1
November ..	15	5	2	4	2
December ...	24	7	1	1	1
January	22	8	2	2	1
February ...	19	1	0	0	0
March.....	31	9	1	0	0
April.....	18	4	2	2	1
May.....	24	5	1	2	1
June	26	4	0	0	0
July.....	26	3	1	0	0
August	19	5	2	4	2
Year	264	62	16	22	11

I have taken in columns 2 and 3 all the cases of depressions appearing south of the parallel of 40°, the latitude of Philadelphia; of these there were sixty-two, and out of this number only sixteen had sufficient energy in them to keep up their individuality until they passed the meridian of Greenwich, possibly very far north. The columns 4 and 5 give those starting in still lower latitudes, south of 35° N. This class includes the West India hurricanes, and has much greater vitality than those above described. Out of twenty-two cases, eleven, or just one-half, crossed the ocean. By this expression it is not implied that the cyclonic system had, throughout its course, or even at any part of it, sufficient energy to be ranked as a storm, or to have been a source of danger to shipping, but it would certainly have produced some disturbances of weather when it approached our coasts.

The dotted line on Plate XIX shows the track of the storm which was central over the ocean on August 31, as already mentioned. It swept over these islands two days later, and finally died out between Aberdeen and Lindesnaes before the 4th of September. It will be noticed that it started on the 25th of August to the northward of Porto Rico, skirted the American coast till it approached Cape Race on the 30th, and then set off eastwards. It was one of the twelve mentioned as starting south of the parallel of 35° N.

Another point of interest is to learn at what seasons disturbances showed themselves in low latitudes on the eastern side of the Atlantic, near the Azores or Canaries. Of these one appeared in each of the months January to July inclusive, and none at any other season. Consequently, in the latter half of the year, we are led to expect that the weather off the north-west coast of Africa would be found to be very constant.

An interesting fact is that in the summer months, April to September inclusive, cyclonic systems coming up the American coast passed up into Baffin's Bay, and eventually died out there. There were

no less than seven instances of this occurrence during the summer examined, and *in most cases* the disturbances were traceable for four or five days within the Arctic regions before their final extinction.

Before I proceed to deal with the subject of the storms which come to us, I must say a word or two about the anticyclones. I made a complete set of anticyclone maps for the 400 days, and found that these systems move from west to east, but much more slowly than the depressions. The area near the Canaries is constantly being replenished by waves of high barometrical pressure coming over from the United States. In the whole thirteen months fifteen such travelling anticyclones were traceable, and none of them appeared in January, February, May, or June. The reasons for these exceptions are that in the late winter a belt of high pressure stretched across the ocean from shore to shore, and that in it no changes were perceptible.

In May and June the pressure over the United States was so low that no supply of condensed air was derivable therefrom.

We now come to the actual storms which are felt on our coasts. During the thirteen months of which we have been speaking thirty-seven severe gales were felt on our coasts. These were classified under the following heads:—

Appearing westward of Long. 40°	17
„ in Mid Atlantic	8
Formed close to the British Isles	9
Appearing to the eastward	3
	37

In order to render it possible to receive intimation of the approach of a storm, this must have manifested itself on the American continent between the parallels of 40° and 52° (Philadelphia and the Straits of Belle Isle), for no depressions start to come eastwards at a lower latitude than 40°, and north of the Canadian system of stations no telegraphic reports are obtainable, and also on the western side of the meridian of 40°, for if a storm appeared to the eastward of that meridian, it could not be clearly represented on a map of the Continent of North America.

Of the seventeen cases included in the list just given, as starting near the American coast, only twelve fulfil the conditions of having come within the area of observation on the other side of the Atlantic. For these twelve storms, the times taken to cross the Atlantic were as follows:—

4	took	2	days.
3	„	3	„
1	„	4	„
1	„	5	„
2	„	6	„
1	„	10	„

It is evident that, in order for warnings of storms to be effectual, they must be timely; and if such warnings are sent from America, a

definite rate of progress must be assumed for each disturbance. The figures just given show, as far as can be shown from the experience of a single year, that this rate of progress varies within wide limits. It is evident that if a warning is issued too late it is useless, and if it is issued too early it unnecessarily causes alarm.

In order to test the possibility of gaining early intelligence of approaching storms, we, for several years, were in receipt of telegrams from the Chief Signal Office, Washington, giving reports of storms experienced by steamers arriving at American ports. The idea underlying this system is that most storms take three or four days to cross the Atlantic, and that a fast steamer can make a run of about 400 miles a day. Such a steamer, encountering a storm some 700 miles from New York, might, on arrival, telegraph the fact to Europe before the storm itself was due here. The practical outcome of all this service has been *nil*, as yet. I am disposed to think that this failure has mainly been due to the facts that the reports from ships have been neither numerous nor full enough. I exhibit the charts for two or three days.

During the year 1887 we received in all 608 ship reports: 452 from ships between 60° and 50° W., and only 156 from ships between 50° and 45° W. Not one of these enabled us to predict a storm, and many of them came in days and days late.

The idea has more than once been suggested that we should moor a ship some 500 miles from the Irish coast connected with Valencia by a cable. This idea has even attained the dignity of being made the subject of a question in the House of Commons. In order to gain the most authentic information on the subject, I applied to the Telegraph Construction and Maintenance Company for an estimate of the probable cost of laying a cable for 500 miles. The answer was that the cost would be about 50,000*l.* or 60,000*l.*—a goodly sum for our office to pay out of its 15,000*l.* a year.

The managing director goes on to say:—

"You might moor a good-sized buoy to the end, with a cage upon it to accommodate an observer. The cage should be of sheet-iron, and well padded with felt and blankets. You must have a tube for him to breathe through. He would have to guess at the state of the weather from the motion; perhaps a gas arrangement might be fitted to enable him to read off his instruments, and the advantage would be that he would probably find himself landed on the Irish coast, on an average, about once a fortnight, without any effort of his own. A sounding apparatus might be fitted, by which he might fix his intermediate positions.

"It would be well to get the experience of some of the Officers of the 'Brisk,' which was moored for six weeks, in some 70 fathoms, off Scilly. One of them on landing went to a lunatic asylum for some months."

You will, therefore, have gathered, from what I have said, that the scheme of telegraphic ships is not very practical; and, in fact, that telegraphy from America, or from the surface of the Atlantic, has not been as yet of much service.

Admiral MACLEAR: Some people think we should look to the moon for our weather; others think that the weather always comes from America; but Mr. Scott has shown the difficulty of obtaining indications for our British weather from America or even from the Atlantic, which is more probably the place where our weather originates. But, failing the possibility of putting a man in a cage in the middle of the Atlantic to telegraph our weather, we might probably arrive at some results by improving our western stations for observing, and having well-trained men who have been accustomed to observe clouds and the smallest indications of a change in the higher regions of the atmosphere, and having well-equipped observatories, supplied with spectroscopes if that is considered necessary, and with a telegraphic communication every half hour, so that the men at these well-equipped observatories at our western stations should be able to say: "There is a cloud rising in the west; that cloud is developing; that cloud is doing so and so." In that way we should certainly get the earliest indication possible of the weather.[1] If I am not mistaken, the first synchronous charts were made of the great storm in August, 1873, and were published by the Meteorological Council in consequence of the effect of that storm. They published charts for the whole of August, 1873. That storm had its origin near Cape de Verde on the African coast. I remember it particularly, because I was not far off the birth-place of that storm in the "Challenger" at the time. We had nothing more than a fresh breeze, but that storm went across the Atlantic following the Equatorial current, turned at the West Indies, and up to Nova Scotia. As it passed over the Atlantic it developed into great proportions and astonishing violence. That storm cost 500 lives and an immense sum of money. A great deal of that mischief might have been prevented by a warning, had some of the West Indian islands been in telegraphic communication with America. That storm broke to pieces at Prince Edward's Island, off Nova Scotia. I do not think that many of the storms that originate on the coast of Africa and go across with the Gulf Stream eventually return to us. I fancy the Gulf Stream interferes very much with them. That stream begins as the Equatorial current and crosses the Atlantic from the coast of Africa to the West Indies, follows the coast of America, and goes back across the North Atlantic like a river, and that river has its eddies which answer to the depressions that Mr. Scott has been speaking of. I do not know what answers to the anticyclyones and elevations, which move at a much slower rate, unless it is some obstruction in the path of the stream, but there is an aërial stream that goes across with the Gulf Stream and follows its motion very well. That aërial stream must be interfered with by the Gulf Stream off the Nova Scotian coast and also by the cold current that it meets there. Mr. Scott has mentioned a rather remarkable circumstance, viz.: that only one storm has been traced right across the world from the Philippines to Europe. One would have thought that in the higher regions of the atmosphere a great many more would have occurred, but no doubt the interference of the Rocky Mountains and other mountain ranges, and I suppose of the Gulf Stream, does prevent the weather coming right across in the lower strata, and what we have to deal with as regards British weather are the conditions of the comparatively lower regions of the atmosphere, which are affected by pressure and temperature over the Atlantic.

Admiral GRANT: I do not rise to criticize the paper, but I am rather surprised at hearing of the progression of the depressions, if I understood the paper right. I just wish to mention a very curious experience I had in February. Coming from the West Indies we entered a depression, barometrical reading 29·30 inches, and we kept that depression without any fluctuation of the barometer at all. There was no diurnal motion in any way. We carried it over 1,500 miles.

General Sir G. WILLIS: I only rise to seek for information. One point is, as Bermuda has been lately connected with the general telegraphic system, whether useful information cannot be obtained from the Bermudas as to the state of the weather, or rather, I should say, as to the state of the Trade winds in the central

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[1] The Hon. Ralph Abercomby has pointed out in "Weather," p. 401, that cirrus often gives indications before the barometer does.

northern part of the Atlantic Ocean, because, judging from the analogy of the Eastern Ocean, if it were not for the disturbing quantity in having ways up to the north between Newfoundland, Iceland, and Norway, we should get pretty nearly as regular weather in the autumn and summer months in the western coasts of Europe as you have in India. I should, therefore, like to know whether it is found that the strength of the North-East Trade Wind, and its more or less northerly trend, which varies considerably and which affects our weather on the west coast of Europe, will enable you to forecast, more or less, whether our late summer and autumn will be a wet and stormy one, or a fine and sunny one. I merely ask this question for information.

Dr. ALEXANDER HERSCHEL: I daresay the point has occurred to Mr. Scott, in connection with the charting for a whole year, which he has described to us with such exceedingly interesting clearness from the collected weather records of the year 1882–83, that the circumstances which occurred then must have been similar to what are just now prevailing in relation to the phenomena of sun-spots. Seeing that at present we have just passed through a time of minimum activity of the sun's spots, and that some extremely abnormal weather conditions have at the same time been presenting themselves, it may be that the records of the year 1882-83, which have been so ably discussed, and so very instructively described to us, may also have presented some features which were abnormal ones then, in somewhat the same manner as the conditions of the weather during the past year or two have been anomalous. I have no doubt that the possibility of some such resemblance has already occurred to Mr. Scott, and it may very probably be of some future interest to keep the possibility in recollection. He spoke of a bar of high pressure reaching pretty constantly, in the later months of winter, from coast to coast across the North Atlantic Ocean, from the neighbourhood of the Azores to near the coast of Greenland; and, as similar high anticyclonic conditions have, for one or two years past, been very prevalent on the eastern shores of the Atlantic, in the late months of winter, perhaps they might be referable in some way to the minimum disturbance epoch of the sun-spot cycle.

Admiral COLOMB: Might I ask whether the Azores would be of any use for the purpose of obtaining information?

Admiral LONG: Having profited much by the forecasts of the Meteorological Office, I wish to ask whether it is considered that the changes of the moon are in any way connected with the weather; whether these disturbances do occur more often during the changes of the moon than at other times. We are told that they do in many of the old books. I know in the Pacific I have noticed frequently, along thousands of miles of coast, that, after the full and change of the moon, there will be a heavy surf. Perhaps Mr. Scott will kindly say if he thinks there is any connection.

Admiral LINDESAY BRINE: I will ask one question on a point that occurred to me on reading the lecture, and that I think must have occurred to most of us. The lecturer was drawing our attention to the manner in which a depression started in Florida in about latitude 30°, went up along the eastern American coast, across to Newfoundland, and thence up by Greenland, Davis's Straits, and also towards the coast of Sweden. That movement of the depression of the storm coincides almost exactly with the direction of the movements of the Gulf Stream, so much so that if you look at any chart of the Gulf Stream, its direction is precisely that which he showed us was that of the depression. I would ask the lecturer to tell us whether, at the Meteorological Office, they have found any ascertainable connection between the Gulf Stream and the barometrical conditions which cause the depressions and the storms. I will not say more, because I am sure he will tell us all we want to know upon the subject when he makes his reply presently.

Captain TIZARD: May I ask one or two questions? First of all as to the heights of the Andes and the Californian mountains, whether they have been well ascertained, because, if they have been, it shows that very little reliance can be placed on barometrical evidence of height? Another thing is, we see by the drawings there an area of high pressure in the neighbourhood of the Azores, and an area of low pressure situated near Ireland. If we can obtain telegraphic information as

to whether any great alteration takes place in either of these pressure systems, would it enable a better forecast to be made of the weather in this country?

Major R. AP H. WILLIAMS: I should like to ask Mr. Scott one question. Is he satisfied with the stations from which the Meteorological Department receive their information? One generally hears that, though they get a certain amount from lighthouses and other places, which are thoroughly exposed to all the winds that blow, a good deal comes from stations which are in partly sheltered situations, and which do not really get the full force of the weather upon them. It is often said that one of the greatest wants of the Meteorological Department is some good observing stations to the north-west of these islands. The island of St. Kilda, which lies some 50 miles to the west of the Western Hebrides, might, I am told, be connected with them by a telegraph cable for some 6,000*l.* or 7,000*l.*, and so be brought into communication with the general telegraph system of the country. It is difficult to imagine a spot from which earlier and more valuable information could be sent. I am glad to think that there is now a prospect of all our lighthouses being connected by telegraph wires, and that we may get constant and frequent reports on all the natural phenomena, which they are ordered to observe, from the very intelligent and trustworthy body of men who are in charge of them. The lighthouses might be employed in sending constant reports to the Meteorological Department.

Mr. SCOTT, in reply: There have been a great many very cogent remarks made on the paper I have had the honour of reading to you. With regard to what Admiral Maclear has said, the only thing I shall refer to is one little slip which he has made, because the charts for the month of August, 1873, were not by any means the first daily weather maps of the Atlantic. The credit of having made the first such chart of the Atlantic is entirely due to Leverrier. He commenced with June, 1864, and for the last seven months of that year and the whole of 1865 he published such charts. With reference to the question of the progression of the depressions, it has been remarked that they move along the Gulf Stream, but it is much more correct to say that they go with the prevailing wind current. The prevailing wind current over the Atlantic in the middle latitude is from south-west towards north-east, and this seems to carry the depressions with it. As a general rule, you find that those depressions move with the prevailing wind current. We had a very striking instance of that over the British Islands last week, when we had two successive depressions coming straight down from the north of Scotland, right along our east coast, with prevailing northerly winds. General Willis spoke about Bermuda. The reports from Bermuda are telegraphed to Canada, and are used in the American weather system, but what we find is that owing to the length of time which any atmospheric changes require to come across from the United States to the coast of Europe, changes take place in the depressions themselves. For instance, a storm which may be very bad on the coast of America may die out before it comes across to us. Therefore we find we cannot trust any reports from isolated stations at such a long distance off, unless there is some means of connecting them by intermediate stations between the point of origin and ourselves. With reference to the very interesting point, as to whether the Trade winds affect our weather, and whether on the whole we can, from a knowledge of what is going on all over the Atlantic, forecast our seasons some months in advance; it is not the first time that that question has been asked, and the first answer that was given to it was given by Franklin. When he was coming from the United States to France in November, 1776, he found certainly a higher temperature of surface water on the track of his ship than he had expected, and, as he expressed it, traced the Gulf Stream right across to Europe; and he said that he thought that the fact of that warmer water existing over the Atlantic indicated a mild and wet winter for western Europe. Sir Edward Sabine took up the investigation afterwards on board H.M.S. "Iphigenia," in January, 1822, and came very much to the same conclusion, but the further investigations which we have been carrying on have not tended to show that you can really draw such conclusions as I have indicated. Sir Edward Sabine used to say that if we could get a regular record of the conditions of the weather close to the Equator, he hoped that it would be possible to predict six months beforehand what sort of season we should have, but certainly no investigations we

have been able to carry out in developing these ideas have yet led to any definite conclusions. Professor Alexander Herschel has asked me about sun-spots. I think the meteorologists would be exceedingly glad if Professor Herschel would give us any sort of rational connection between sun-spots and weather. We used to hear a great deal about this matter, but for the last nine or ten years we have heard very little indeed, and we cannot tell what the connection is. We know perfectly well that if we have abnormally cold weather there is not very far off from us an area which has abnormal warmth. Is it the abnormal warmth or the abnormal cold which is produced by the sun-spots? It has been shown over and over again, that whenever we have an intensely cold winter, probably the area of warmth lies somewhere over the Mediterranean, somewhere not very far off there is a compensating anomaly; and if you take the world as a whole the same general conditions of temperature exist. It is not possible to say whether or not the mere fact of our having very wet or dry weather is due to sun-spots when our neighbours not very far off have exactly the contrary. During the wettest weather we had two or three years ago in the summer, there was not a fish to be had in the north of Scotland; there was no water in any river there. So that a district so near to us as the north of Scotland was exceedingly dry, while the south of England was very wet. Last summer everybody was abusing the weather because of its wetness. I myself was then living in the Black Forest, and we had four days' rain in eight weeks. Which of these conditions depended on the sun-spots, was it my fine weather or was it the rain here? Admiral Colomb and Mr. Williams raised very much the same question about telegraphing from places where wires do not exist. All we find is that telegraphing is only possible if the connection is paid for commercially. M. Tietgen, the Chairman of the Store Nordiske Telegrafen Selskab in Copenhagen, which extends its wires from England to Japan through Siberia, has repeatedly come forward requesting that a telegraphic cable should be laid along the line which Sir Leopold McClintock surveyed, by the Faroes to Iceland, Greenland, and Labrador. M. Tietgen's Company is quite prepared to lay the line if each of the countries will guarantee him 2,000*l.* a year, but there is not a single country that will do that for pure meteorology. It is simply a question of money; unless a cable will pay commercially, it is hopeless to expect it to pay for scientific observations. It is the same case as to St. Kilda; the cable will not be laid unless it will pay commercially. We have got a cable extended to Belmullet on the coast of Ireland. How was it extended there? The police guaranteed half the cost, and the Meteorological Office promised to contribute a regular amount. Previously the police at Belmullet had to keep up a stable of horses in order to communicate with Ballina or Castlebar, a distance of about forty miles. Sir Robert Hamilton, then in Dublin, arranged the whole matter with us, and it was settled that if we would pay 3*s.* or 4*s.* a day, that is, if we guaranteed a certain number of messages per day, the Post Office would establish the line. The whole question of telegraphy from outlying stations depends on that point; there must be a certain rental guarantee to the Post Office, or they cannot lay down the wires. One gentleman asked about the moon and the weather. It is very curious how long these things last. One thing is quite certain, that the changes in the moon take place simultaneously over large areas, but storms do not take place simultaneously. If a storm coincides with the change of the moon on the west of Ireland, it does not coincide with it in England. I have often heard it said by Officers who have been stationed off the coast of Australia that we have very little idea of the effect of tides, and of the immense area of coral reefs, that are left bare at low water at spring tides, and the intense action of radiation, all tending to produce changes of weather. But all these things are not sudden, they are gradual, and they certainly do not produce sudden changes of weather. I have referred to Admiral Brine's remarks about the direction of the storm coinciding with the Gulf Stream. Captain Tizard asks whether the heights of the Andes and Californian Mountains have been determined. The height of Pike's Peak has been determined, and of Antisana, the height given is not that of the mountain, but of the observing station on its side. As far as it is known, those heights have been clearly and absolutely determined. He also spoke about the telegraph from the Azores, but that, too, has not been floated commercially. I think that nearly finishes the matter, excepting as to the

question of getting additional information from the lighthouses. We find a good deal of difficulty in organizing even such a very simple thing as getting our temperature observations from the lighthouses. Some of the men are pretty good, but some of them are not. They used to say that no man with much brains in his head would ever go into a lighthouse; he would be driven mad by the monotony of staying inside, with the bright light inside and a gale blowing outside. We do not find that they are really as trustworthy as we could wish. I will give you an instance. There was a light-ship struck by a meteoric stone some years ago. The stone burst on board, and the men felt the fragments under their feet on the deck; they washed them all overboard next morning. The stones were worth nearly their weight in gold, but the men washed them out into the sea.

The CHAIRMAN (Captain Wharton): We have to thank Mr. Scott very much for his most interesting *résumé* of this, to us, very interesting subject. One point which he has brought before us very strongly, and which it is very necessary for anyone to understand who wishes to comprehend our complicated weather, is that there is no difference between a storm and a depression; that if the depression of the barometer in the centre of an area is slight as compared with the pressure outside, you will have a comparatively light wind: if it is great you will have a strong wind; but how you are to tell whether a small depression is going to develop into a large one, or whether it is going to die away, is just the point which baffles, so far, all calculation. And that is the great difficulty in attempting to forecast: the changes are so rapid, and are, so far as we know, so complicated, that we cannot understand them. Therefore there must always be a considerable amount of doubt as to whether the forecast is correct or not. A storm coming from the Atlantic, racing in, as Mr. Scott has described, after a two days' passage of the Atlantic, will sometimes stop dead short of the British Isles, and play about, so to speak, over the north coast of Ireland for two or three days after having raced in. All these things form the subject of daily examination and record; but meteorology has not been in existence long enough to enable anybody to attempt to forecast those circumstances. It is in that that lies the, so far as we can see, impossibility of forecasting seasons long beforehand. The more you study our meteorology, the more you see that our weather depends upon little local circumstances—whether the depression takes a little turn to the north; whether it takes a turn to the south; whether it stops, whether it goes on. Those are the circumstances that really affect our weather. We all know that there are seasons of general warmth or general cold. We should much like to know—and we try to discover—the causes of such seasons. But although there are certain weather prophets who are bold enough to give us weather a great many months in advance, you cannot expect any serious meteorologist to enter into such wild prophecies as those. The forecasts of the Meteorological Office must be founded upon, so far as we can have them, sound grounds. I slightly differ from Mr. Scott in one point; but perhaps we are thinking of two different things. I am thinking of what Dr. Herschel said about sun-spots. Here in England I do not believe you will ever be able to trace any connection between weather and sun-spots, for the reason that Mr. Scott gave, viz., that the weather is so variable over small areas; but I am a great believer myself in the direct effect of the condition of the sun on the weather in more settled regions. The great series of observations on the cylones of the Indian Ocean, to which Dr. Meldrum has devoted his whole life, and the data that he has collected, show, to my mind, most incontestably, that in large areas where the ordinary circumstances of the weather are extremely regular and quiet, there is distinct connection between disturbances and sun-spots. In our latitude, where weather is so much upset by constant local disturbance, I do not think that any connection will be made out. There is also another point in which I differ a little from Mr. Scott: that is, the physical possibility of having a ship moored in the Atlantic. It is a very favourite vision, I think, with everybody who knows, that a large part of our weather comes from the Atlantic; and, although the result of the "Brisk" is not very encouraging, a great deal depends upon the form of the ship: how far she will be uneasy or bearable in a storm; and I may mention, as a proof of that, that two years ago, and the year before that, when the entrances to the British Channel, south of Ireland, a long way west of Scilly, were being

re-sounded, the little "Research," a small paddle steamer, rode out three very heavy westerly gales in 70 fathoms of water. It was not very pleasant on board, but nobody went into a lunatic asylum. It was simply ordinarily reported as a circumstance that had taken place, without any idea of there being any particular hardship in it. The ship only pitched, and I thought it was a very encouraging circumstance, and I do not see why, some day in the dim future (I do not suppose I shall ever live to see it), when there is a good deal more money available than there is now; when we have solved the difficulty of keeping the cables clear of the anchors, and when we know more about meteorology, and the value of it is assured, we should not have such a ship. You will all agree with me, I am sure, in thanking Mr. Scott very heartily for his lecture.

Friday, March 25, 1892.

GENERAL SIR DANIEL LYSONS, G.C.B., &c., &c., Constable of the Tower of London, in the Chair.

MILITARY BAND ORGANIZATION.

By Colonel T. B. SHAW-HELLIER, Commandant, Royal Military School of Music, Kneller Hall.

DELIVERED IN THE BANQUETING HOUSE, WHITEHALL, AND ILLUSTRATED BY PERFORMERS FROM THE KNELLER HALL BAND.[1]

THE subject of military music has of late years been so prominently before the public, that it is felt that for its introduction here, no apology is necessary.

Of the history of the subject, or of the connection between music and the military profession, it is not intended to speak. Suffice it to say, that the military band has become an integral part of every regiment or battalion, not only in the Army of this country, but in those of every civilized nation throughout the world. And, indeed, the use of music serves not only as a powerful mental stimulant to the soldier, but, by rendering the Service popular with the classes, it acts as an incentive to recruiting.

When soldiers hear the martial strains of a band playing, perhaps old national airs of their country and of their childhood, it arouses their patriotism. Love of home, Queen, and country asserts itself; *esprit de corps* is fostered and encouraged to a degree far greater than is generally recognized; and troops can by these means be aroused to a pitch of enthusiasm that, without music, would be impossible. I do not say this as an enthusiast—it is a simple fact, and one that our greatest Generals are well aware of.

Here in England, where we have the opera, the concert-room, and the theatre within easy reach, we little know the benefits good bands confer upon the Army, and more especially when upon foreign service, whether on the line of march, in the field, or in camp. The tired soldier forgets his troubles when he hears the band, and it goes a long way towards keeping up his spirits and making him cheerful, contented, and happy. With troops in such a frame of mind how much can be done! How many operations can be successfully carried out that with despondent or half-hearted troops could only result in

[1] The lecture and music were highly appreciated by a large audience in the Banqueting House.—ED.

failure! The value of music as a means of arousing men's passions is very great. The great Napoleon well knew this, and invariably took care that the bands of La Grande Armée should be well cared for. And the average private soldier, however innocent he may be of so-called classical music, yet *does* appreciate *good* music, and in those regiments where the band plays in public, for the benefit of the men, and the soldiers are allowed to bring their friends, sweethearts, and wives, proof of this will never be wanting, for there will always be a full and appreciative audience. And so I contend that effective military bands—those orchestras of the soldier and people—are able to do good service, even if they only provide a wholesome recreation, and develop a taste for innocent and intellectual amusement, in the enjoyment of which the soldier and the people may mix freely.

Military music, then, being an integral part of the organization of the army of a civilized country, it remains for me to sketch the present state of the military band in England, and also to bring forward certain suggestions as to much-needed reforms and improvements.

When the Royal Military Exhibition of 1890 was first proposed, I was requested, as Chairman of the Musical Committee, to provide for the performance of varied programmes of popular music in the grounds of the Exhibition. As this seemed to us to offer an opportunity, probably unique, for enabling the public to judge of the capabilities of our best military bands, we thought that by the introduction of music of a higher class into the programmes, and by arranging for a constant succession of different military bands, brought from all parts of the kingdom, much good might accrue. Thanks to the kindness and approval of H.R.H. the Commander-in-Chief, we were enabled to carry out the plan.

During the time the Exhibition remained open, no fewer than seventy-four different military bands were engaged, most of them remaining in the metropolis for a week. By these means it has been possible to form a very fair idea as to the general state of military music in this country, and, in addition, to gain a considerable amount of knowledge as to the working of our present system—its merits and its demerits—which it would otherwise have been impossible to obtain.

As the development of military music is, like everything else in the Army, rapidly progressing, it is becoming more than ever necessary that military musicians should be in accord and touch with the musical profession; and also that their career should, from a professional point of view, offer material advantages.

The present organization of a military band is as follows:—

1 Bandmaster (ranking with sergeant-major, but junior).
1 band serjeant.
1 corporal.
20 musicians.

In addition to these there are usually about eight boys who are learning to become musicians.

In almost every regiment or battalion there are also about ten or twelve private soldiers, old bandsmen that have joined the ranks for the sake of promotion, who, for the love of music, *in addition to their ordinary duty*, voluntarily play in the band, and are known as "extra bandsmen." The number of efficient players is thus raised to about thirty-six to forty. These "extra bandsmen" (who only play when the band are playing in public, not on parades), although not officially recognized as bandsmen, nevertheless exist in every regiment; indeed, were this not the case, no band worthy of the name could exist.

Our military bands are usually recruited in three ways—

1st. By means of boys who are trained to play certain instruments and can be enlisted from certain schools, such as the Duke of York's School, and others of which the War Office issues a list for the guidance of Commanding Officers.

2nd. By men who volunteer from the ranks to join the band. Perhaps, of these, one in ten is found after some six months' trial—involving constant attention and labour on the part of the Bandmaster—likely to become of any use.

3rd. By professional musicians who are specially enlisted, but who nevertheless are required to pass the usual soldiers' drills and tests, and are not allowed to join the band at once, but are kept at gymnasium, drills, &c., for at least six months before their services can be utilized by the Bandmaster. The number thus enlisted is of course for that reason very limited.

With regard to the enlistment of the boys, the choice of them should be left—subject to the approval of the Commanding Officer—in the hands of the Bandmaster. He could then get his vacancies filled by thoroughly efficient pupils, who already know something of their instruments, and his time would not be wasted, as it is now, in trying to teach boys who, musically speaking, are often useless. As it is, bandboys are frequently sent to regiments under orders from the recruiting department; the Bandmaster has no means of seeing them before they join, and they not unfrequently turn out useless, absorbing vacancies which might be filled by good players, if chosen regimentally. For example, in one regiment I know, during the last year and nine months, some eight or nine boys were thus posted. None of them knew a note of music, or played any instrument. This is by no means an isolated case, and it is one of the greatest hardships that our military bands are subjected to. This system should be changed, and the selection of bandboys be left either to such competent authority as the Royal Military School of Music, or to Bandmasters of regiments themselves.

It is, therefore, evident that the Bandmaster must virtually create his own material, musically speaking; and in order to do this it is more than ever necessary that he should be a man both of high educational attainments, and also of a social position considerably above that of his men. A short explanation of the system which obtains at present will here be of advantage.

As the regulations now stand, the post of Bandmaster can be obtained by any good military musician, not under the rank of sergeant,

who passes the necessary qualifying test at the Royal Military School of Music, Kneller Hall. He must, before he is allowed to proceed there as a student, have had *seven years' service* as a musician and be a sergeant. It has, however, been found advisable, in certain cases, to recommend a relaxation of this rule. He then passes before entrance a test examination. The course of study at Kneller Hall lasts according to the ability of the student, who has to pass a further test before he is promoted to Bandmaster, and is sent to join a regiment as such.

A few words about the Royal Military School of Music. Founded in 1857, by H.R.H. the Commander-in-Chief, it has, I believe, fully attained the position H.R.H. anticipated. Kneller Hall is now a most flourishing institution and gives as good a musical education in *its own particular sphere* as can be had at either the Royal Academy of Music or the Royal College of Music. The sergeants training for Bandmasters take on the average two years to qualify for their position, and the boys eighteen months for regimental musicians.

As Professors, we have some of the leading artists: Messrs. Clinton, Egerton, and Martin, for the clarinet; Mann, for the horn; Varness, oboe; Barnard, piano, organ, and string instruments; Cousins, bass, euphonium, and trombone; Radcliff and Oldham, flute; and Hardy, bassoon.

The qualified students act as assistant masters and see that the pupils work up the exercises set by the Professors.

After the students pass the final examination, the papers for which are set by public examiners, viz., Dr. Bridge, Messrs. Kappey and Sommer, and carried out by the Educational Department, they come on the roster for conducting the band, and are most carefully instructed in this art.

Work commences at 9 A.M. till 6 P.M., two hours for dinner and recreation at mid-day, and one hour for recreation 4 to 5 P.M. A voluntary class for string practice is held from 6.30 to 8 P.M.

This Institution might with great advantage be much enlarged, and should be made a depôt for regimental bands. Of course this means a certain outlay for increased accommodation and a larger staff of Professors, but in the end there would be a great saving to the public. The boys would be selected from the best schools, and I have no doubt that many of our professional musicians would send their sons into the Army when they knew what a superior education they would get if sent first to Kneller Hall; and, when they had become proficient, be transferred to some regiment where they would be well clothed, fed, and able to put money by, with the prospect of promotion and a pension, instead of, as is often their own case, grinding away to the very end of life, relying on some benevolent society for a pension they can barely exist upon.

There is another point that I would bring to your notice in the organization of the band. As, no doubt, most of you are aware, the bandsmen are borne on the strength of the eight various troops or companies, and to their different Captains look for promotion, pay, clothing, &c., the Bandmaster, except in matters musical, being a

mere cipher. It is a well-known fact that most of our successful musicians have a strongly developed business capacity, and this faculty is, I believe, found rarely wanting in musicians. It seems, therefore, more reasonable to give the Bandmaster entire control over his band, and to organize the band for administrative purposes *as a separate company* under the Bandmaster, who would be directly responsible to the Commanding Officer or other Officer appointed by him. The position of the Bandmaster would then be considerably strengthened; his men would look to him as the private soldier looks to his Captain, viz., their real head, both as regards music, discipline, pay, and promotion; and his position, a more important point than at first appears, would be improved both socially and regimentally.

To this rather radical change some Commanding Officers of very conservative ideas might object. Some Bandmasters would also deem it unpalatable, and the more lazy would dislike the extra responsibility. But yet, on the whole, the *ultimate* result (I do not say *immediate*) would be to place the Bandmaster in a more dignified and responsible position. The men consequently would have more regard for him, and his task would, *ipso facto*, be more congenial and in many ways smoother than at present. The post of Bandmaster would then offer inducements to such men who under existing circumstances prefer to become in time cathedral organists, conductors of large orchestras, or musical directors of our leading theatres; competition in the musical world has, however, become so severe that, of those who have studied at the Royal Academy and Royal College of Music, many serve but to swell the ranks of a profession much overcrowded, and to increase the numbers, already in excess, of underpaid organists and teachers of music to whom existence is a struggle. It would be well, therefore, if the authorities of these institutions would inquire into the advantages offered to the military musician. I shall only be too glad to give them every information, and hope they may see their way to recommending students of military inclination to join the Army, with the hope of attaining the position of Bandmaster; for a Bandmastership in the British Army is a post that any gentleman might be proud to hold. I should be glad to welcome musicians of this stamp into the Service.

The principle of perpetual interbreeding is considered bad for rearing sound stock, and stock thus bred is liable to deteriorate. Does not this hold good in art? Of course it does. So I would welcome these youths, as it would cause both greater stimulation amongst military musicians generally, and would introduce into many band rooms an element of wholesome and artistic competition greatly to be desired.

As things now are, a Bandmaster seldom has his band together even during practice hours. Men are continually taken away for trivial company details even in the best managed regiments. Commanding Officers, however careful they may be, cannot always prevent friction between troop sergeant-majors or colour-sergeants and the Bandmasters or bandsmen. Such small annoyances fall to the lot of almost every Bandmaster. Were he to complain, as he often

might with good reason, he would probably be made to feel it in other petty ways, and so he usually remains silent, wisely determining discretion the better part of valour.

By the adoption of the separate company system, therefore, all these petty annoyances—and I speak with a considerable, I might perhaps be allowed to say possibly *unique*, knowledge of the subject—would be obviated entirely.

It has been contended that were a band organized as a separate company in the way that I have proposed, a number of men would be lost to the ranks for fighting purposes. I submit that the recognized duty of bandsmen on service should be to act as "first aids" to the wounded. How our recent small wars have amply proved that our hospitals and Medical Staff are, from want of men, greatly handicapped in this respect. What, then, would be the case in a great European war? With the increased range of the rifle, and the adoption of the machine-gun rapidly becoming universal, I contend that, unless largely augmented, our Hospital Staff would find it very difficult to cope with the additional work. And this is how I propose to make practical use of the bands. To be efficient, a band should contain at least thirty musicians (irrespective of boys and learners), two corporals, and two sergeants. They should be at all times an administrative unit under the actual control of the Bandmaster, and should be armed with revolvers and swords. They should be taught to use these weapons, and should undergo an annual course with each. Every bandsman ought to have a certificate from the Medical Officer as a qualified "first aid" to the wounded; they should be instructed in stretcher bearing, and should be annually inspected in these duties by a Medical Officer. As bandsmen are of necessity men of good education, and, by reason of their profession, of manners probably more gentle than those of the average private soldier, such employment would do much to relieve the wants of a regiment in time of war, when the Hospital Staff is almost always too hard worked and much undermanned. A number of men thus trained, closely united by that feeling of *esprit de corps* and *camaraderie* which exists perhaps more strongly among bandsmen than among the generality of soldiers of the present day, would be a most welcome and valuable adjunct to a battalion upon active service.

A comparison with the system of military bands that obtains in the German Army will here be of interest.

An average German military band is thus composed—

1 Bandmaster (Stabshauboist. Sometimes called Musik Director or Kapellmeister).
10 Musicians (hautboisten).
About 36 assistant-bandsmen (hülfshautboisten).

The Bandmaster has the relative rank of a sergeant-major (feldwebel), and is the *immediate superior* of the band (for discipline as well). The ten hautboisten have the relative rank and pay of unter-officier, a rank, in this case, somewhat equivalent to our lance-sergeant, as they are allowed to wear the badges of rank as sergeant.

The hülfshautboisten or assistant-bandsmen enter as privates for three years, which period may be, and usually is, prolonged; and they may be advanced to the rank of "gefreiter" (somewhat like our corporal); in case of vacancies occurring among the ten hautboisten. they may be promoted to fill them. They may, however, be allowed, at the discretion of the Officer Commanding, to wear the badges of rank of an "unter-officier," as a purely honorary distinction. In all cases, rank in the bands is, as has been stated, relative rather than executive.

Every encouragement is afforded for the bands to play in public, and the men are allowed to accept private engagements, when not detrimental to the performance of their military duties: the moneys received in these cases are considered as the natural perquisites of the bandsmen, who are recognized as musicians *first*, soldiers *afterwards*, yet none the less soldiers; all advancement, however, is for *musical* excellence, as it should be. Consequently, each man individually strives his utmost to excel and to increase his musical knowledge. The relative value of money in Germany being less than in England, I do not enter into detail as to the pay or emoluments of the Bandmaster or bandsmen. It may suffice to say that a system somewhat akin to that in our own Service prevails, the Officers *all* subscribing a certain amount, which varies in different regiments, towards the band fund. The subscription, I believe, is fixed by the Colonel of the regiment. There is also a fixed contribution from what is known as "the reserve fund" of the regiment; and this is sometimes augmented by grants from other regimental funds at the disposal of the Officer Commanding.

As a further contrast, let us examine the constitution of military bands in France.

A full regimental band in the infantry of the line and the artillery consists of:—

1 Bandmaster (Chef de Musique).
1 Assistant-Bandmaster (Sous-Chef de Musique).
30 Musicians (musiciens).
15 Assistant-musicians (élèves).

In cavalry and rifle regiments, the band is thus organized:—

1 Bandmaster.
1 Assistant-Bandmaster.
22 Musicians.
15 Assistant-musicians.

These numbers, except in the cavalry, do not include the trumpeters, drummers, and buglers of the regiments. In the cavalry regiments, the trumpeters are borne on the strength of the band, in which they play some instrument, when off duty as trumpeters.

The bandsmen have a special relative rank, akin to that of lance-corporal. The assistant-bandsmen (élèves) rank as private soldiers.

The Bandmaster ranks as a Sub-Lieutenant, and is therefore a Commissioned Officer. After ten years' service as Bandmaster, his pay

is increased, and he ranks as a Lieutenant. The rank is, however, *relative* and not actual. The Assistant-Bandmaster ranks as "adjutant," a rank in the French Army almost equivalent to our sergeant-major, and not to be confounded with "Adjutant" in the English Service. Assistant-Bandmasters and Bandmasters are appointed, as vacancies occur, from musicians selected from the various regimental bands, who have been successful at a competitive examination in theory of music and instrumentation, held under the auspices of the Paris Conservatoire, there being no institution in France corresponding to Kneller Hall. The candidates must possess, in addition to their theoretical knowledge, the faculty of imparting instruction, and have also a practical aquaintance with every instrument used in a military band. They must, of course, have satisfied the authorities that they are educated men and socially fit for their position. I may here mention that about the year 1884 several distinguished German Officers visited Kneller Hall, with the result that the German Government have established a school of music somewhat similar to Kneller Hall for training their military Bandmasters, feeling that it is essential that they should be specially trained, and that an ordinary musician has not got that special training which is necessary for efficiently teaching the younger instrumentalists, as well as leading a military band.

Bands in the French Army are managed, as with us, by a committee of Officers in each regiment, and are supported by a Government grant or "maintenance fund," which is augmented in various ways such as by subscriptions from the Officers and from other regimental funds at the discretion of the Commanding Officers of regiments.

The question of pay and pensions in France I do not propose to examine, since in an army recruited by conscription a fair comparison is obviously impossible. It is, however, well to say that every encouragement is afforded by the authorities for the bands to play in public places for the amusement of the people, and inducements are held out for the men to accept private engagements when compatible with their military duty. And so in provincial towns the military bands take the place of local orchestras where none exist; and since music is more generally appreciated there, the military musician is socially in a position far higher than that held by the average private soldier.

Time, unfortunately, does not permit of a detailed examination of the state of military music in Austria, Russia, Italy, Spain, Belgium, or other countries. It may suffice to say that in these countries the military band is a recognized adjunct of every regiment, and that the bands, as a rule, are never less than forty strong. Indeed, in Austria and Spain especially, they frequently number as many as eighty performers, the Bandmasters often being men of note in the musical world and artists in every sense of the word; consequently, every inducement is afforded by the authorities for capable musicians to take service.

Let us now examine the pay and emoluments and pensions of the Bandmaster and men of the British Army. They are as follows:—

	Daily pay.	Allowance from band fund.	Average season's engagements, concerts, &c.			
Bandmaster	5*s.*	Yearly £70		About £28	0	0
Band-sergeant	2*s.* 4*d.*	Some regiments		„ 7	16	0
Band-corporal	1*s.* 8*d.*	and battalions		„ 4	15	0
Bandsmen	1*s.*	allow 10*s.* per month to the band sergeant, and extra pay to a limited number of bandsmen; the soloists usually receiving 3*d.* per diem, and eight or ten others of the best musicians 2*d.* or 1*d.* per diem, according to merit.	Classed according to efficiency.	„ 4	12	0
				„ 3	4	0
				„ 2	1	0
Additional for each good conduct badge obtained respectively after 2, 6, 12, 18, and 20 years' service	1*d.*					
Extra bandsmen	1*s.*			„ 1	9	0
Additional for each G.C. badge, as above	1*d.*					
Boys	8*d.*			„ 1	9	0

These rates of pay are exclusive of quarters, fuel and light, rations, and uniform.

The band-sergeant is subject to a deduction of about 7*d.* a day for his messing; the corporals and the men and boys to a deduction of 3*d.* a day. In the case of married men this deduction is not made. And in the event of one of the recommendations of Lord Wantage's Committee upon recruiting being acted upon, these deductions will cease to be made.

With regard to the allowances from the band fund, they vary in different regiments. The Bandmaster, however, receives 70*l.* per annum *by regulation* in every corps.

The engagements vary at different stations. Those given here represent the average of the band of an infantry regiment at a large military station in the south of England. In some places, where there were no other bands stationed, they would be considerably more, and in others perhaps less; always greatly depending upon the energy and efficiency of the Bandmaster, and the support accorded to him by the Commanding Officer. With bands such as the Royal Artillery, Royal Engineers, Royal Marines, and the Guards, the engagements would of course be worth infinitely more.

In stationary bands bandsmen can also increase their earnings by accepting private engagements, such as playing at dances, evening parties, and in the orchestras of the opera and the theatres.

The pensions obtainable by military musicians are as follows:—

	s.	*d.*	
Bandmaster, after 21 years' service (five years of which he must have been a warrant officer)..	3	6	per diem.
Ditto, after 25 years' service, ditto	4	0	„
Ditto, after 30 years' service, ditto	4	6	„
Band-sergeant, after 21 years' service (12 years of which he must have been sergeant)	2	3	„
Band-corporal, after 21 years' service (12 years as corporal)	1	8	„
Bandsmen, after 21 years' service, *nominally* as corporal if enlisted at 18 years of age	1	6	„

As the present pension warrant is interpreted, it is impossible for any bandsman to obtain the maximum pension, since it requires twenty-four years' service before obtaining 1*s.* 8*d.* per day. Hence a boy enlisting at 15 years of age must be made a full bandsman at once in order that he may complete twenty-four years. Then three years' boy service deducts 0½*d.* per day for each year, so that the maximum pension is *really* 1*s.* 6½*d.* This is so clearly an injustice that common fairness demands its removal.

And here it might be mentioned that, although the private soldier may one day hope to rise to commissioned rank, yet this is denied to the bandsman or Bandmaster, who can never hope to become anything further than a warrant officer. Consequently when a student has left the Military School of Music, and has been appointed to a regiment as Bandmaster, he has reached the *acme* of his profession. He is subjected to no proper supervision, except, indeed, as regards discipline, and his band may be *the best* or *the worst* in the Army. He probably begins by being very keen, and works hard at his band, but, musically speaking, no one find faults where necessary, or encourages him with judicious criticism when he most needs it. Few Commanding Officers know how, and many do not care thus to interfere with their Bandmaster, fearing perhaps to display ignorance of matters musical. The want, therefore, of efficient musical inspection for military bands is evident to all who know what they *ought* to be and what they *might* be *with no extra cost to the public.* Were there such supervision exercised (at all events over bands in the United Kingdom), and the industrious Bandmaster given the hope of eventually rising to commissioned rank, how different the military music of the country might be. The Bandmasters of the stationary bands, such as the Royal Artillery, Royal Engineers, Royal Marines, and the Household Troops, ought, by reason of their responsible positions in the musical world, to hold the relative rank of Lieutenant. As vacancies for these appointments occurred they should be filled by the promotion of other selected Bandmasters from the Army who have shown proficiency, industry, and artistic excellence as displayed both by their work, their teaching, and the *ensemble of their bands.* Thus encouragement would be given to the younger Bandmasters of the Army to work, and these prizes could be within their grasp. Indeed the improvement of military music should be regarded, not only as a

purely military question, but also from a national point of view. The class of music common in ordinary programmes of military bands might be improved. The occasions on which they perform render this, perhaps, difficult, although not impossible, of accomplishment. One fact is, however, pretty clear, that is, that existing circumstances prevent the *public* from hearing our fine military bands as often as they might. Here in London, for example, are six of the finest military bands in the world; and there are within easy reach some fifteen to twenty others, and yet when do the public ever hear them? Do they ever play in the parks, or anywhere where admission is not charged? Surely some action might be taken, and it might be found possible to encourage military bands to play in public, and to accept such engagements as were offered by the London County Council, and were virtually going a-begging last year. More frequent opportunities, and perhaps more *responsible* opportunities, would have the effect of awakening the consciences of those in command. In the selection of the programmes there would be no occasion to prefer music of a *heavy* nature; the public ought to have variety, but artistic lines should be drawn in the selection of the music. Were such programmes noticed more freely by musical critics and in the daily papers it would have a good result.

To improve our bands, then, it is necessary to raise the position of the men. At present I might almost say that Dante's inscription over the gates of the Infernal Regions might with good reason apply to the band-room, as regards prospects of promotion, "All hope abandon ye who enter here." Out of all the number there is one sergeant, one corporal! Why should an intelligent man remain? What hope has he of promotion? In one band I could name three men who *left* the band are now Quartermasters; ten others who left hold far better positions than it would have been possible for them to obtain by remaining.

Let the number of the bandsmen be raised to thirty, and let them be classified, the 1st class wearing the decorations, and holding the relative rank of sergeant; the 2nd class, of corporal; and the third, of lance-corporal, promotion from one class to the other being for musical excellence and good conduct. The characters of the musicians would soon show an astonishing improvement.

Bands being placed upon a special footing and organized as administrative units, treated as professional men, would attract men of artistic feelings to enter them. Obtaining their education free, the country would have a right to expect a prolonged service, which would in the case of bandsmen be for at least fifteen years, and for full pension twenty-four. Performers would then have a motive for improving themselves, and our military Bandmasters would soon be among the most eminent musicians of the day.

Many of our young artists, often in the most extreme poverty, would gladly embrace the career of a military musician, and would work and study with the zeal and ardour that talent exhibits when properly encouraged. They would then find in such a career all they could desire, personal consideration, the honour due to artistic skill,

and the prospect of rising and making a name for themselves in their profession. May this prove one of the fruits of Her Gracious Majesty's most happy reign.

To recapitulate briefly, I would submit that if the following suggestions were carried out, *while no extra expense would be caused to the country*, our military music might be brought to a degree of excellence greatly to be desired.

1. Bands to be organized as separate companies; the men to be considered *first* as professional musicians; soldiers afterwards, *yet none the less soldiers.*

2. The bandsmen to be augmented to thirty in number, and to be arranged in three classes. The effective non-commissioned officers to have relative rank as follows:—Band sergeants as 1st class staff sergeants, band corporals as troop sergeant majors and colour sergeants. Musicians of the 1st class to have the *relative* rank of sergeant; of the 2nd, that of corporal; of the 3rd, that of lance-corporal: the pay, however, to remain as at present. All promotions in the band to be made at the recommendation of the Bandmaster, and for *musical excellence* and good conduct.

3. To give commissions to the Bandmasters of our stationary bands, and of the Household Troops. These appointments to be filled up when vacancies occur, as at present, by other Army Bandmasters, promoted on account of their artistic strivings and work, as shown by the *ensemble* of their bands and general teaching. Let the Bandmaster's responsibility be balanced by his power and privileges. Increase his authority over his men, and his moral influence will be what it ought to be.

4. To lengthen the time of compulsory service for bandsmen to fifteen years, and for full pension, twenty-four.

5. That our military bands play more in public places, for the benefit of the public, and that our military musicians be encouraged to accept orchestral engagements when possible. This will bring them more among the musical world. Interchange of professional ideas is always beneficial, no matter what trade or profession a man may follow.

6. When practicable, some musical supervision over military bands —I do not mean *interference*. The knowledge, however, that at any moment their bands were liable to be musically inspected would often keep young Bandmasters up to their work, and prevent their lapsing into idleness.

7. Bandboys to be selected either by Bandmasters of regiments, or by the Military School of Music. Commanding Officers should have the power of discharging at once any bandboys reported as being incorrigibly idle, or musically incompetent, and therefore unfitted for the band.

And now, perhaps, I may be asked, "Why make this stir about bandsmen?" Who, I may ask, are generally the best shots in a regiment, the best cricketers or football players, and who make the best non-commissioned officers? Who are the life and soul of regimental amusements; the mainstay, in fact, of *esprit de corps?* Why!

the band. Usually "nobody's children," belonging to every company in the regiment, and commanded by half a dozen different Captains, not to mention the Band President or the Adjutant, the only wonder seems to be that, with our present organization, our bands are as good as they are. We have excellent material, we have the ability and the capacity for work, and yet, *with no additional expense*, our bands might become the finest in the world. Our motto should be, "Dum spiro spero." May I be excused if I say it is too often "Dum spero *spiro*" (often out of tune).

Military Music.

Time will not permit me to go into the subject of military music; but I hope on some future occasion to read a paper on military music, illustrated by the Kneller Hall Band; therefore I will only give a short introduction before the band plays the several pieces I am enabled to produce.

I have to express my thanks to Colonel Bowdler Bell, Captain Day, Captain Mahony, Lieutenant Griffiths, and the authorities of the British Museum for much valuable information, also to the Rev. Mr. Galpin, Messrs. Mahillon, of London and Brussels, Messrs. Rudall and Carte, and Messrs. Boosey, for so kindly lending me some of the ancient instruments for the production of the interesting music which is now to be played.

I. March, "Des Lansquenets," 17th century. 8 flute douces and 1 drum.

II. March, "Brussels Municipal Guard," 17th century.

The instruments are 2 cornetti, 3 hautbois, 3 cors Anglais, 2 bassoons, 1 trombone, and drum.

III. March, "De Lully," 18th century. (Lully.) 4 hautbois, 3 cors Anglais, 3 bassoons.

IV. Gavotte, "Louis XIII." Same instrumentation.

V. The next march, I found the parts at my own home, where they have been hidden away for over a century. It is called "Elliott's Light Dragoon March," and arranged for 2 cornetti, 2 horns, 2 bassoons, 1 serpent, and kettle drums. These instruments are of the same period as the march, 18th century.

VI. "March of the 13th Regiment": German. This march is copied from a book published before 1771. On the title page appears the following paragraph:—

"The several German Regiments these Pieces belong'd to never intended they shou'd appear in Print, but one of the principal musicians quitting the Service, who had copys of the books belonging to the different Bands, thought it wrong such excellent music shou'd remain in Obscurity. For the delight and Amusement of Lovers of Martial Music and Good Harmony he has made them Public." I have chosen what seemed the best, and feel sure you will appreciate this Excellent Music and Good Harmony.

VII. Marches (slow and quick), Body Guard of King Louis XIV, 18th century. 8 trumpets in D, kettle drums.

VIII. March, band of the Hundred Guards, 18th century. 6 flutes 1 drum.

IX. March, Foot Guards, 1760, I obtained at the British Museum and verified the instrumentation from an old print.

2 clarinettes, 2 oboes, 2 trumpets, 2 horns, 1 serpent, 1 bassoon, tambourin, triangle, cymbals, 1 kettle drum, 1 bass drum, and jingling johnny.

X. "Prince Edward's March," same date. 2 small clarinettes, 2 trumpets, 2 horns, 2 bassoons, 1 serpent, 1 ophicleide, 1 tenor drum.

XI. "The 4th Dragoon Guards' March." This march was composed by Eusebius Hull.

According to a pianoforte score, 2nd edition, which was published before 1832, it was performed with the most rapturous applause at the Theatre Royal, Covent Garden, also at the Theatre Royal, Dublin.

I have the score of this march, arranged by Mr. Eckersburg, who was sent over by Mendelssohn, to whom Colonel Chatterton had written to get a Bandmaster for the 4th Dragoon Guards; this arrangement was finished in 1840, and I think you will all agree that it is a most admirable piece of scoring, and that the old march sounds a deal better in its old than modern dress.

The score is for 2 cornopeans, 7 trumpets, 4 trombones, 1 ophicleide, and kettle drums.

XII. March, Quick step. (Lieutenant Griffiths.) Specially written for this occasion.

Trusting that I have not wearied you, and that advantage may accrue to the bands of the Army from the suggestions I have brought forward, the band will now play as a *finale*

XIII. The *allegro moderato* from Schubert's Unfinished Symphony.

Sir DANIEL LYSONS: Ladies and Gentlemen. It is announced on the programme that after the lecture there will be a discussion. If any gentleman or lady therefore would wish to make any remarks we shall be obliged if they will send up their cards. As, however, I do not see anybody coming forward I conclude I may take silence as a general approval. I am sure I can corroborate all that Colonel Shaw-Hillier has said with regard to the influence of music on troops on the march. When I was a youngster I marched a great deal in Ireland. We were generally employed in tithe gathering and illicit still hunting. On those occasions we always took our band with us, and I assure you it made the army most popular. Wherever we halted for the night we had the band to play, and we always had a dance, and I need hardly tell you that very few tithes were collected while the band were playing. The still owners were equally grateful to us; for our martial sound always gave them timely notice and enabled them to get everything which was valuable safely hidden away. It is now my agreeable duty to propose a vote of thanks to Colonel Shaw-Hillier for his excellent lecture, and I must also include his most excellent band, and its capital leader, and I do not think that I shall complete my task unless I equally ask you to thank those gentlemen who have provided the curious old instruments that enabled the band to represent the ancient music as it was rendered when it was first composed.

The resolution was carried by acclamation.

Sir DANIEL LYSONS: I am sure I may present the thanks of the whole meeting to you, Colonel Shaw-Hillier, for your excellent lecture, and for your admirable band.

Thursday, April 7, 1892.

MAJOR-GENERAL SIR HENRY J. ALDERSON, K.C.B. (h.p.), R.A., President, Ordnance Committee, in the Chair.

FIELD HOWITZERS AND MORTARS.

By Lieutenant-Colonel N. L. WALFORD (h.p.), R.A.

WHEN I accepted the invitation, which the Council of this Institution did me the honour to give, that I should read a paper on "Field Howitzers and Mortars," I did so with very considerable misgivings, since I felt that I was in truth called upon to prophesy publicly with reference to matters on which there is at present scarcely sufficient information to enable an opinion to be formed.

Only two nations, the Russian and the Swiss, have as yet definitely organized batteries answering to the above description; in other armies the question is still in the experimental stage, while in no case has either the armament or the organization of such batteries undergone the stress of war, which must ever be the ultimate test of excellence and efficiency.

It is evident, therefore, that any criticism of the systems adopted by the two Powers mentioned must be limited in its scope by our want of experience, and that the utmost that can be done is to endeavour to reason from the causes which have led to the introduction of high-angle-fire batteries, and to thus deduce the character of their probable armanent, organization, and duties in the field.

I propose, therefore, to speak first of—

The Causes which have led to the Introduction of Howitzer and Mortar Field Batteries.

These causes are two in number; they are—

1. The flat trajectory of modern field guns, which, while it has increased the probability of hitting a vertical target in the open, has rendered it impossible, at medium ranges, to reach troops standing behind cover, either natural or artificial, except on the condition that that cover can be pierced or beaten down.

2. The powerlessness of the shell of modern field guns against such cover as is now used, together with the increasing tendency to make use of cover, not only in the defence but in the attack. This powerlessness is due not, as some imagine, to the inefficiency of modern

field shell (which are indeed far more powerful than of old), but rather to the increased strength of such cover as is used in the field, together, as before mentioned, with the tendency to more frequently make use of such cover.

It may be interesting, while considering this point, to study the probable reasons which have influenced Russia and Switzerland, which differ so widely in all respects, as military Powers, in their political situation, and in their geographical position, in the adoption of this equipment, and have made them the pioneers in Europe of an entirely new departure in field artillery.

These reasons were, however, I believe, founded on one event, namely, the defence of Plevna, by Osman Pasha; but that defence has been regarded by the two peoples from a different point of view. Russia, whose very size renders invasion practically impossible, while her position places her beyond the highways of Europe, has regarded the question of high-angle fire in the field from the side of the attack, whereas Switzerland, having learnt a lesson from the events of 1800 and 1814, proposes to forbid the passage of her narrow valley to the great contending Powers, and thus devotes her entire attention to the means which may assist the defence.

It is scarcely necessary that, while discussing this point, I should go into detail with regard to the Russian attack on Plevna, for which, moreover, the time at our disposal would not suffice; but I may, perhaps, be excused if, in order to substantiate my statement that the Russians have introduced the new weapon for reasons connected with the inefficiency of field guns against earth defences, I mention the following facts, drawn from "La Guerre d'Orient," published in Paris in 1880.

Previous to the third battle of Plevna, the Russians fired during the three days, the 8th, 9th, and 10th of September, upon the Turkish entrenchments with 400 field guns, of the calibre of 3·4 and 4·2 inches, and with twenty siege guns of the calibre of 6 inches; this fire was principally directed on three works, the Kerim-Tabia, the Grivitza redoubt, and the Central redoubt.

The result is thus described:—

"The effect of the projectiles against the infantry lines and the redoubts of the Turks was *nil;* that against the other works of little importance, either as regards the destruction of the parapets or with respect to the losses caused to the defenders. Whenever, in consequence of a concentrated fire, the parapets had been reduced to shapeless masses of earth, they still continued to afford sufficient shelter to allow of their rapid repair, use being made of earth from the ditches and from the interior, and of gabions kept in reserve for this purpose."

The author further states that this failure was due to the fact that the shells of the field guns were not sufficiently powerful, while those of the siege guns did not burst, owing to defective fuzes. It may also be added that projectiles striking at a low angle have a natural tendency to ricochet, while even in cases where the earth is penetrated, the shell tends always to rise to the surface and may thus, unless the

action of the fuze is instantaneous, leave the parapet before it bursts.

Where, however, the slope of descent is steep, both the probability and amount of penetration are increased, and, especially if a delay-action fuze be used, the utmost value of the bursting-charge may be fully utilized.

The Russians were thus led to the introduction of the new form of field artillery by the conviction that, in order to obtain good effect against cover and on troops in rear of it, it was necessary to use a large shell, falling at a high angle. Both of these conditions pointed to the employment of a mortar or howitzer, since a gun which should fire a large shell with a high velocity would be too heavy for field artillery, while it would further fail to provide a steep slope of descent.

The reasoning of the Swiss we may presume to have been different. Asking only be left in peace, and with no wish for territorial aggrandisement, they desire only to be in a position to refuse the passage through their country to all belligerents; their military system is thus founded on the defensive, since such a passage would be attempted only with a view to gain time, and the certainty of a delay of even only a few weeks, which could be provided by a line of defensive works, if rightly placed, would of itself prevent any attempt being made to force a passage against the will of Switzerland.

In her case, therefore, the field mortar has, we may suppose, been introduced in order to combine, in the defence of a fortified position, the shell power of a siege with the mobility of a field gun, with the object of providing a means by which the stationary guns and howitzers, of which the effect may be neutralized by the unforeseen action of the attacking force, may be supported in their time of need from improvised positions. Morover, the high trajectory will enable such a piece to search hollow ground, in which the enemy's troops may seek concealment or cover from the low-angle fire of the defence.

In either country the practical object is the same, namely, the destruction of cover and of troops in rear of cover, by means of heavy shell fired from light guns. Howitzers and mortars, when used in the field, have, however, another advantage over guns, of which we may expect that much use will be made. They can themselves, thanks to their high trajectory, fire over cover which is more than sufficient to protect them from the fire of guns, unless the latter are at such a distance that their fire will lose very much in accuracy. For example, a howitzer posted anywhere within 80 yards behind a railway embankment 30 feet high could not be hit by a 12-pr. gun at a range of 2,500 yards, while it could itself fire on the latter.

We may say, therefore, that the introduction of field howitzers and mortars is due to the need which has been felt of the presence with an army of a piece which shall throw a heavy shell (for the destruction of cover) at a high angle (for the evasion of cover), and which shall be sufficiently mobile to admit of its marching with

an army and of its being readily moved from one position to another.

We may pass on to—

The Nature and Tactical Use of Field Howitzers and Mortars.

The use of field howitzers in war is no new thing; not only had we them in our Service in the past, but we have even now in India batteries provided with such pieces. It is, however, necessary to distinguish carefully between what has been and what is now proposed.

Many of us can remember that, not long ago, in the days of smooth-bore guns, every field battery was composed of four guns and two howitzers, which formed the centre division, or, as it is now called, section. In those days the guns fired only round shot, and the presence of the howitzers was due to the need which was felt for some pieces which could fire shell of a sufficient size, while the extremely moderate length of the range of the howitzers was but a small defect, when the musket was useless at ranges exceeding 150 yards; moreover, the larger bore of the howitzers rendered their case shot more valuable both in attack and defence.

These howitzers disappeared as soon as the invention of rifled guns, throwing an elongated projectile, enabled us to fire effective shell from field guns; it is, however, interesting to note that the muzzle velocity of the Armstrong 9-pr., our first rifled horse artillery gun, was 1,055 f.s., only 120 f.s. more than that of the Swiss mortar, which has an initial velocity of 935 f.s., and throws a shell about 40 lbs. in weight.

The field howitzer of former days was, in fact, a field piece of large bore, throwing a shell heavy in proportion to its own weight, but not so heavy but that the piece and its wagon could move with and at the same pace as the lighter equipment of the guns; its adoption implied the voluntary weakening of the long-range power of the battery (as long range was then understood) with the object of providing greater power at very short, but then decisive, distances, while the mobility of the battery was not affected by the substitution of howitzers for guns, though the number of rounds carried for the latter was of course less than that provided for the former.

There was, however, in those days no idea of carrying into the field shells of the weight of 40 lbs., and still less of 60 lbs., which is the weight of the shell of the Russian mortar, since field entrenchments had not then attained the excessive development which they have now reached, nor was the destruction or demoralization of their garrisons previous to an attack of infantry of the same importance in the days when the assaulting party was out of range of musketry at 250 yards, as it is now, when unaimed fire may (at the cost, it is true, of an enormous expenditure of ammunition) be effective at even 3,000 yards.

Thus, the howitzers of those days were, in every sense of the word,

field pieces, whereas now, though we speak of field howitzers, we really mean a weapon which, though fairly mobile, and able at any rate to travel on roads, shall throw a shell of the weight and capacity of a siege projectile, and which thus, since the chief factor of mobility is the weight of the projectile, cannot be placed in the same battery or even in the same tactical unit with a truly mobile field gun.

The closest analogy to the proposed form of howitzer is to be found in our Indian heavy field batteries, which are, in fact, not field batteries at all, but a hybrid between field and siege batteries; but these are still mixed batteries, having four guns and two howitzers. This hybrid organization is a survival, and will probably give way before the opinion which is gradually forming, that shell-power and not gun-power is the most essential quality for the destruction of cover or of troops behind it.

We may say then that the recent introduction of field howitzers is really a new departure, though it has been to some extent foreshadowed, and that its inception is simply a well-marked phase of the constant struggle for supremacy which is always going on between guns and defences, whether the latter be armour-plates or merely earthen parapets. We must own, however, that the increased power of the latter has obliged us, as a type of this last phase, to sacrifice the mobility of the field howitzer to the absolute necessity of using a powerful, and therefore a heavy, projectile. Again, such mobility as is possessed by these pieces is bought at the price of shorter range, since guns to throw shell of the required weight would be incapable of keeping pace with the march of an army, while, moreover, the size and weight of the howitzer shell implies that the number of rounds which can be carried for each piece will be far less than is the case with field gun batteries.

Passing on to consider the tactical use of howitzer and mortar batteries, it will be evident, from what has been already said, that the object of the existence of these batteries is entirely distinct from that of the field gun batteries, and that they will thus be used to supplement and not to replace the latter. The shrapnel shell, the main (and we may hope soon to be the only) projectile of field guns, is most destructive when used against troops in the open, but depends for much of its value on a fairly low trajectory, a fact which, taken in combination with the small bursting charge, which cannot be increased without considerable danger of diminishing the effect, renders it so far useless against troops under cover, that little effect can be produced on them, except at the price of an excessive expenditure of ammunition; while the common shell, if it be allowed to continue to exist, is, even though much or all of its man-killing power be sacrificed for the purpose of obtaining a large burster, still too weak to be effective in the destruction of cover of any thickness. It is, therefore, to supplement this deficiency of power that the field howitzer is to be introduced; this piece may, however, fail in the opposite direction, since, owing to its high trajectory, its shrapnel, except at short ranges, may have little value.

We find, then, that each fraction of the field artillery of the future will be weak in the very point in which the other is strong, and each will thus serve to support, but should not be allowed to compete with, the other.

Following out this line of argument, we see at once that for the ordinary purposes of war, for the daily struggle, and even for the main part of the action in battles fought under normal conditions, the field gun will preserve its supremacy, while the use of the howitzer or mortar will be comparatively exceptional, and will be limited to such actions or to such points in a general action as call for the employment of special means of attack or defence. Another reason exists why the use of field howitzers should be limited, namely, the necessity for economy of their ammunition, since the carriage of large supplies of shell, of which two weigh a hundred weight, will sorely try the transport and load up the ammunition columns.

It follows, from what has been already said, that the rule with regard to the forward position of artillery in the order of march will not apply to field howitzer or mortar batteries, since, in the case of accidental meetings with the enemy, they would rarely be required, as the foe would have no time to construct intrenchments, while in the event of a position fully prepared for defence, it may fairly be assumed that timely knowledge of the existence of such a position would permit of their due arrival on the field of battle. If it be admitted that this theory is correct, it will be seen that there is, in this case, no very great disadvantage in the fact that howitzer batteries will be, for the most part, tied to roads, and that they must further, owing to the great weight and size of their shell, be composed of a number of carriages greater than that which constitutes an ordinary field battery, and must thus occupy a greater length of road.

What has been said above applies mainly to the attack; the defence must always obtain great advantage from the presence of batteries which cannot be silenced by the enemy's guns, provided always that their positions are selected with ordinary care and with some regard to the probable contingencies of the action; it must, however, be borne in mind that positions chosen with a view of affording cover to batteries using high-angle fire will not, as a rule, permit of the defence by the batteries of the ground in their immediate front, and that there is thus some danger of howitzers, if retained in their original position, becoming powerless for action at the critical moment.

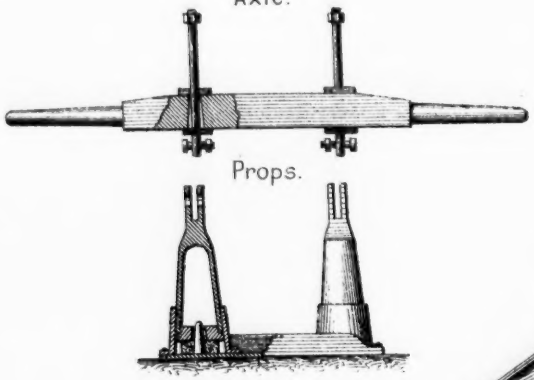
Considering the time which is at our disposal, it may be well to pass on to—

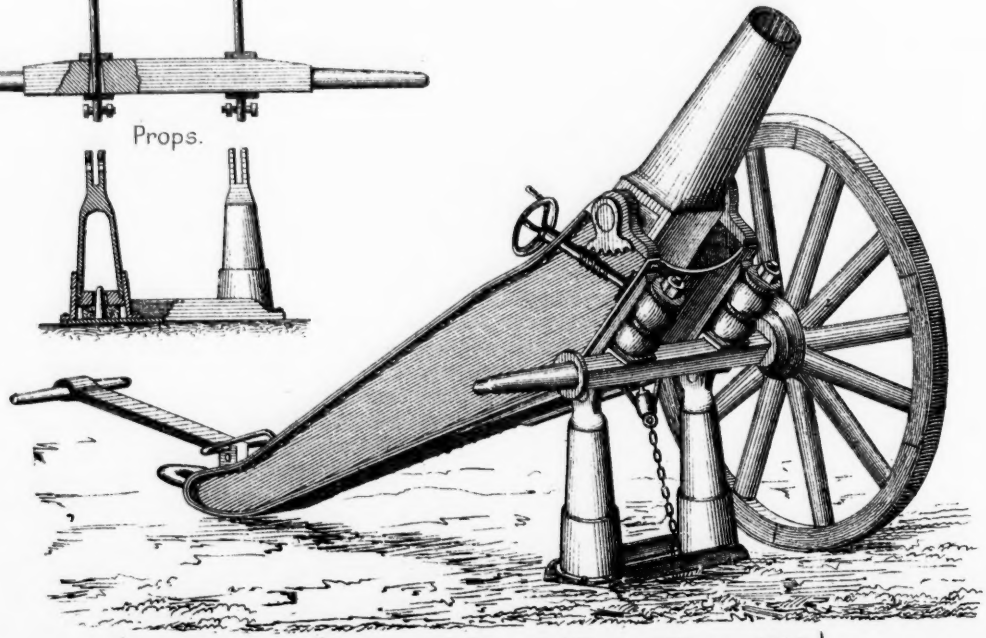
The Armament (including Howitzers, Carriages, and Ammunition) of Field Howitzer or Mortar Batteries.

It will, in the first place, be necessary to discuss the present distinction between a howitzer and a mortar.

In the old days the difference was very clear; not only were the

Russia. 6-inch Field-mortar.

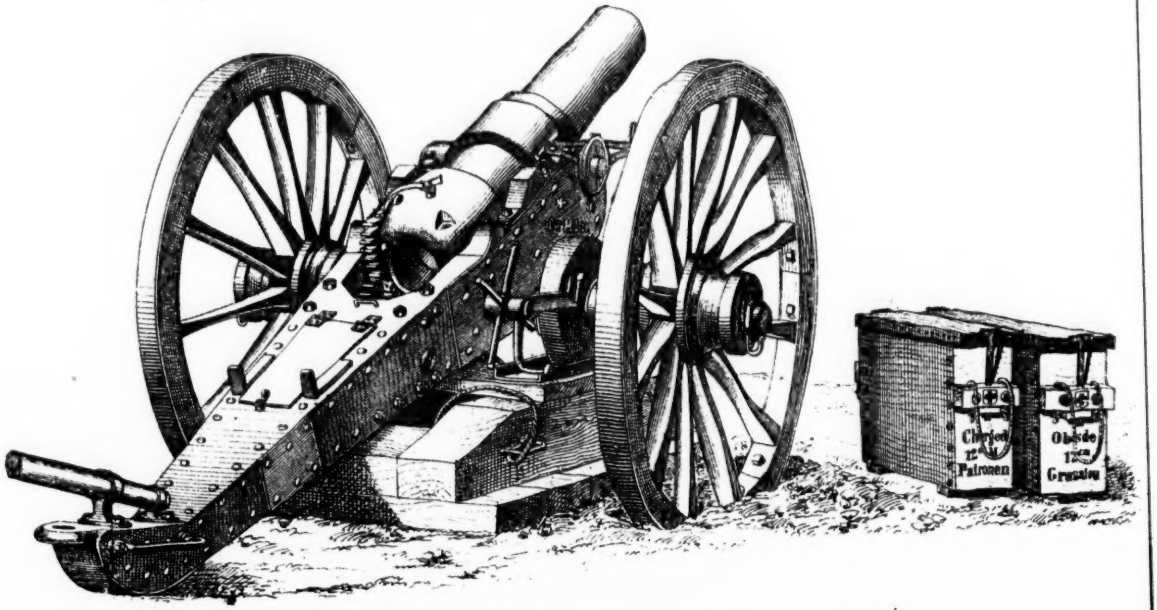




(From Schubert's "Feld und Gebirgs Artillerien." Vienna, 1890.)

Harrison & Sons, Lith., S. Martins Lane, W.C.

Switzerland. 4·7-inch Mortar in action.



(From Schuberts "Feld und Gebirgs Artillerien" Vienna, 1890.)

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two pieces entirely unlike in appearance, but they differed essentially, owing to the fact that the howitzer, which was, in fact, a weak gun, varied its range, like a gun, by means of a change of elevation, but kept, also like a gun, invariably the same charge; on the other hand, the mortar, while used almost always at one elevation, varied its range by means of a change of charge.

This difference has entirely disappeared; the charge and the elevation are now varied both in the case of the howitzer and of the mortar, while the outward appearance of the two pieces, except in some instances as regards their length, is similar. Speaking generally, we may, however, say that a piece is called a howitzer when it is capable of firing at any elevation up to 35°, while it is called a mortar when its range of elevation extends over that amount.

Since the amount of elevation which can be given to any piece depends entirely upon the mounting, it is obvious that a weapon may thus be a howitzer or a mortar according to how it is mounted; as far as the piece itself is concerned, the distinction, has, indeed, ceased to exist, and all light guns throwing heavy shell at high angles with a low velocity are both howitzers and mortars; the former, when they are on a travelling carriage, giving elevation up to 35°, and the latter, when on a standing mounting, admitting of a higher angle of elevation. If we further take the case where one piece has both descriptions of mountings, all difference disappears. On these grounds I propose to speak of the above description of weapon by only one name, that of howitzer, the French *obusier* or shell gun, a generic term.

With regard to armament of field howitzer batteries as proposed by the principal European Powers, I am sorry to say that I have little to add to the statement which I made in my lecture of last year, to the effect that France, Spain, and Russia preferred a 6-inch calibre, while Austria, Sweden, and Switzerland were inclined to adopt one of 4·7 inches, Germany being doubtful between the two calibres, while the United States have adopted a calibre of 3·6 inches, and a 20-lb. shell. These facts testify to the struggle which is going on in the minds of those responsible for the choice of calibre between shell power and mobility, or between shell power and range.

Of Russia and Switzerland, which alone have accepted a complete equipment, the former has assumed shell power as the more important of the two considerations, while the latter, influenced also partly, no doubt, by economy (since the new howitzer is an old gun bored-up), has chosen gun power, as shown by the longer range. The main differences between the two armaments are shown in the accompanying table.

The time at our disposal will not allow of a detailed description of these armaments, but a few words as to their general character may be desirable.

The Howitzer.—The piece itself will, in all probability, as a rule be constructed of steel, as is the case with the Russian mortar; Austria may, however, offer an exception to this rule, since she still holds to steel-bronze as the material for her field guns; while Switzerland, making use, as has been mentioned, of old guns, has

used both steel and bronze for her new howitzers. We may assume that, whatever the material, the weight of such a howitzer will not exceed 9 or 10 cwt.; this will imply a length not exceeding 9 or 10 calibres.

The Carriage.—The howitzer carriage, as compared with the gun carriage, has to resist a lesser shock, but receives it in a direction tending to exercise a greater strain, which, at high angles of elevation, will be but little relieved by the recoil. It must thus be made exceptionally strong, unless, indeed, other means be taken to assist the axle and wheels against the vertical component of the blow.

In the Russian carriage, the bolts which connect the body with the axle are provided with indiarubber buffers, which, when the howitzer is in action, are inclined at an angle of about 45° to the horizontal; these, by their elasticity, tend to diminish the shock of the discharge upon the axle, which is further supported by two props, also bedded on indiarubber buffers. The plate on which these props rest is held fast to the axle by a chain of which the length can be adjusted, and the whole system thus recoils with the gun. In this manner the shock of the discharge, attenuated by the top buffers, is transferred through the axle and the lower buffers to the ground, the wheels being saved from the blow by making the props of such a height that they are lifted off the ground.

When the Swiss mortar is brought into action, small trenches are dug for the wheels, and the weight of the piece and carriage is allowed to rest on a portable bed, which is inserted between the wheels, and has two grooves on the upper surface; in these grooves run two cast-iron rollers, acting as trucks to carry the weight of the whole system. In this case also the wheels are relieved from the shock of the discharge; but, since the charge is smaller and the shell is lighter than in the Russian equipment, we do not find any buffer arrangement introduced with a view of sparing the axle. The bed is carried on the carriage, and weighs 3 cwt. 1 qr. 20 lbs.

The Charge.—The charges used by the Russians and Swiss are given in the table; they are, of course, small in proportion to the shell, and give comparatively low pressures. The division of the charge by the two nations is worthy of notice, and, in this respect, the Swiss system appears to be the better, since the Russian division into $\frac{1}{2}$ and $\frac{1}{4}$ gives only four charges, viz., $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and whole, whereas the Swiss, using $\frac{1}{2}$ and $\frac{1}{3}$, have five, viz., $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{6}$, and whole charge.

The Projectiles. Common Shell.—The Russians use a common shell, weighing about 60 lbs., with a bursting charge of 10 lbs.; while the Swiss have a ring shell, of 40 lbs., with a bursting charge of 2 lbs. 2 ozs.

In the absence of actual experience it is difficult to decide which of these weights is the better, but it seems probable that the Russian shell is heavier than is necessary, and the Swiss lighter than is desirable.

Every pound added to the weight of a shell beyond what is absolutely necessary to enable it to do its work is a distinct disadvantage,

since an exaggerated weight brings with it one or more of three consequences, viz.:—

1. Either the number of rounds carried must be small; or
2. The weight behind the team must be large, *i.e.*, the mobility of the battery must be diminished; or
3. The number of wagons with the battery must be increased, and thus the length of the column on the line of march be augmented.

The Russians, in order to avoid the first two disadvantages, have accepted the third; their mortar battery, at war strength, consists of thirty-six carriages, and would occupy about 600 yards of road. The Swiss, on the other hand, have held to six wagons, and thus, though their shell weighs about 40 lbs. to the Russian 60 lbs., their wagon teams have to draw 46 cwt., and their gun-teams an average of 42·5 cwt. to the Russian 38 cwt. and 28 cwt., and they have, nevertheless, only 70 rounds per mortar with the battery, in place of the 92 rounds of the Russians.

The problem is hard to solve, but one thing is certain, that the common shell must at all costs be equal to its work, that is to say, it must be of such a weight as to be capable of perforating any cover (including overhead cover), which is likely to be encountered in the field, and must contain a sufficient bursting charge to destroy it after penetration. On the other hand, every inch of size and every pound of weight added after these conditions have been satisfied is a very serious disadvantage.

Shrapnel Shell.—Each of the equipments before us has a shrapnel shell; the Russian weighs 68 lbs. and contains 683 bullets, while the Swiss, with a weight of 39 lbs., has 475 bullets.

The question as to the probable utility of shrapnel for high-angle fire is being discussed with some warmth on the Continent; on the one hand, it is urged that an effective shrapnel of large size will have an enormous effect on troops, even though they be under cover, if its bullets descend at so great an angle that the cover gives but small protection; on the other hand, it is stated that the observation of high-angle shrapnel fire is so difficult, and the effect of even apparently effective shrapnel so small at a high angle of elevation, that it is more than probable that the garrison of an earthwork would be driven from their defences by common shell in less time and with less ammunition, even if with less loss, than would be the case if shrapnel were used. Moreover, it is pointed out that shrapnel is almost useless against overhead cover.

The quarrel is a very pretty one, as it stands, and it may be sufficient to say here that, since these weapons will undoubtedly be sometimes called upon to fire at low angles on troops in the open, we cannot afford to dispense entirely with shrapnel, while the choice of his projectile may be safely (and best) left to the Officer who commands the battery in action.

It will be observed that neither of the equipments before us includes a case shot; this appears to point out that these batteries will not be expected to defend their immediate front; and, moreover, seems to imply that they will fire principally at long ranges beyond the reach

of the enemy's cavalry, unless, indeed, it be intended that they shall always be attended by a special escort. Such limitations appear to be undesirable, and I venture to think that the omission of this projectile is an error.

Other details.—Having decided on the weight and the capacity of the shell, it is next necessary to consider what should be the extreme range of the howitzer; this will govern the muzzle velocity, and, therefore, the charge, and therefore, again, the weight of the howitzer, while the amount of recoil and the necessary strength and weight of the carriage must not be left out of account.

Comparing the equipments now before us, you will see that the Russians, accepting a lower extreme range than the Swiss, have a lower muzzle velocity; thanks to this decision, their mortar, though firing a heavier shell, is lighter than the other, while, their carriage being only 84 lbs. heavier, their total weight behind the team is 3 cwt. less than is that of the lighter of the Swiss equipments.

We thus see that, when considering the details of this or any other field equipment, three main points have to be decided; these are—

1. What is the least size, capacity, and consequent weight of a shell capable of doing the desired work.

2. What is to be the extreme effective range. This decision governs the muzzle velocity, and thus the charge; from the latter, again, we must deduce the weight of the mortar, and indirectly the weight of the carriage, as being dependent upon the amount of shock on discharge and the force of recoil.

3. What is the greatest weight behind the team which will not injuriously affect the mobility of the piece, taking into account the circumstances under which it will be used in war; this condition acts in opposition to the two former, and generally leads to important modifications, resulting in such a compromise as forbids perfection in any one point.

It is not my purpose to say to-day anything with regard to our projected equipment, since the time has not yet come to make public what is being done; but I am desirous to bring before you the considerations on which the designing of an equipment must be based, in order to show that this is no simple matter, nor one which can be decided in a moment.

The Equipment and Organization of Field Howitzer Batteries.

The equipment of a Russian field mortar battery consists of 6 mortars, 18 ammunition wagons, 6 carts (to bring up the ammunition to the guns), 1 spare carriage, and 5 store wagons.

You will notice at once the large proportion of ammunition wagons to mortars, large even for the Russian Army, in which field and horse artillery batteries have 12 ammunition wagons. This proportion shows the immense importance attributed by the nation which has last been engaged in war on a large scale to a sufficient supply of ammunition.

On reference to the table you will see that 92 rounds per mortar

are carried with the battery; of these 12 are carried in each limber, 24 in each wagon, and 8 in each cart.

The distribution of the weight behind the team is thus as follows:—

Mortar, Carriage, and Limber.

	cwt.	qrs.	lbs.
Mortar	9	0	6
Carriage	12	2	6
Limber	8	2	22
Ammunition	7	1	20
Stores	0	2	17
Total	38	1	15

Wagon and Limber.

	cwt.	qrs.	lbs.
Limber and wagon-body	12	0	0
Ammunition	14	3	12
Stores	1	2	3
Total	28	1	15

You will observe here, first, that the total weight, as given in the table, does not include any men carried on the limber or wagon; if three numbers be mounted on the limber and six on the wagon, the weight will be brought up to—

	cwt.	qrs.	lbs.
Mortar and limber (with six horses)	42	3	15
Wagon (with four horses)	37	1	15

I have brought these figures to your notice for two reasons:—

1. I want to point out that the weight behind the teams must be enormously increased, if any large proportion of the detachments be carried on the carriages, while, since these batteries will seldom move faster than a trot, and then only for a short distance, it will rarely be necessary to mount the men on the limbers and wagons.

2. I will ask you to notice the very small weight of stores carried; it is so small that we may suppose that none of the personal equipment of the men is on the carriages. All this, as well as every item of stores which can possibly be dispensed with, is apparently conveyed by the store wagons, which do not form part of the fighting battery.

To the best of my belief this arrangement holds with all batteries on the Continent; the French are especially notable in this respect, since their horse artillery carry only a few pounds of stores with the gun (though it must be acknowledged that their wagon is excessively heavy). Surely this should be the rule with all field artillery, who should carry nothing with them but what they actually need daily in

the field, and not overload themselves with all and everything that they may require at some time or another. It may be remembered also that the personal equipment is piled not only on the carriages but also on the draught horses, with the result that a near horse carries a load, in addition to the weight he is expected to draw, of about 18 stone; can we wonder, then, that horse artillery find it difficult to compete with cavalry, who are not handicapped by any weight behind them, and do not suffer from the checks and strains inseparable from rapid movement over rough ground? But, perhaps, I am wandering a little from the subject of my present paper.

To return, I will ask you to consider the supply of ammunition in a Russian mortar battery, viz., 92 rounds per mortar.

We shall not, of course, expect the same rate of fire from a howitzer as from a gun battery, namely, 3 rounds per minute, but we may fairly ask for 1 round per minute as the ordinary rate of fire. On this point I find it stated that the Russians fired 50 rounds in 45 minutes from a battery of 6 mortars.

Assuming that 1 round per minute will be a fair average, the Russian battery carries sufficient rounds to keep up its fire for 552 minutes, that is, for 9 hours, without drawing on the ammunition column, or, as they call it, the "flying park," which carries additional ammunition sufficient for a further fire of $9\frac{1}{2}$ hours. That is to say, the Russian mortar batteries could fight a general action on two consecutive days, using only so much ammunition as would be carried with the field army.

The Swiss batteries, with the ammunition carried on the carriages of the battery, could fight for more than seven hours, or, including that with the ammunition column, for two days of ten hours each.

But in order to have this supply of ammunition, one nation (the Russians) has 24 carts and wagons with the battery, while the other (the Swiss), though using only a 40-lb. shell, has a weight behind the wagon team of more than 46 cwt.

It is evident that we are here again approaching a very knotty question, which divides itself into two parts, viz.:—

1. What is the smallest amount of ammunition which a howitzer battery *must* carry?

2. Assuming that the wagons should be as mobile as the guns, what is the least number of wagons which can carry this amount of ammunition? This last point is, you will observe, again dependent upon the weight of the shell, assuming even that it is not complicated by a demand that the wagons shall carry some of the detachment.

With regard to the personnel and horses, the Russian battery appears to be organized in a similar manner to the other field batteries; it consists of 5 Officers and 226 men, with 167 horses.

The latter are probably (judging by the heavy field batteries which have approximately the same establishment) divided as follows:—

Riding Horses.

Officers' horses		5
Non-commissioned officers' horses ..		18
Draught Horses.		
6 mortars	36	
18 wagons	72	
6 carts	6	
1 spare carriage	4	
2 store wagons.....	8	
3 store wagons	6	
Spare horses	12	
	—	144
		167

This branch of the Russian artillery is organized in four regiments, each of four batteries and a flying mortar park; a fifth regiment is shortly to be added. On mobilization, the flying mortar park is expended into a mortar park brigade of 4 parks, in addition to which each regiment has a mobile and a local mortar park. The Swiss organization is by batteries of 6 mortars, which are brigaded with gun batteries to form units of position artillery.

The Place of Field Howitzer Batteries in Army Organization.

The unit of position artillery in the Swiss army is the brigade division, which consists of 12 4·7-inch guns, 12 4·7-inch mortars, and 8 3·14-inch guns.

There are 5 of these brigade divisions, giving a total of 60 mortars, to which may be added 10 spare. The brigade divisions are entirely independent of the present divisional and of the suggested army corps organization of the Army, and can be attached provisionally to any force which may require them. It is probable that they will be told off to assist in the defence of certain specified (and in some cases already prepared) positions, and will be used by the Commander-in-Chief of the Army as circumstances may dictate, constituting thus a distinct force outside of the establishment of field or mountain artillery.

With regard to the Russian mortar batteries, nothing appears to be laid down as to their distribution among the corps of the field army, and it thus seems to be more than probable that they also will be retained, as independent units, at the disposal of the supreme military Commander, to be combined by him in accordance with the need for them, and to be attached, in case they are required, to any corps which may be engaged in operations calling for their assistance.

We have as yet no certain knowledge of the German organization of this description of field artillery, but various signs tend to point out that howitzers will be used, in brigade divisions of three or four batteries, as army artillery, contra-distinguished from corps or divi-

Details of Field Mortar Equipments.

	Russia.	Switzerland.
Mortar—		
Length	4 feet 6 inches.	4 feet 11 inches.
Material	Steel.	Steel and bronze.
Weight	9 cwt. 0 qr. 6 lbs.	Steel, 10 cwt. 2 qrs.; bronze, 12 cwt. 1 qr. 19 lbs.
Carriage—		
Weight, unpacked	12 cwt. 2 qrs. 6 lbs.	11 cwt. 3 qrs. 6 lbs.
Weight, packed	22 cwt. 2 qrs.	29 cwt.
Limber—		
Weight, unpacked	8 cwt. 2 qrs. 22 lbs.	7 cwt. 0 qrs. 20 lbs.
Weight, packed	15 cwt. 3 qrs. (12 rounds).	14 cwt. 1 qr. 24 lbs. (10 rounds).
Wagon—		
Weight, unpacked	12 cwt.	15 cwt. 2 qrs. 7 lbs.
Weight, packed	26 cwt. 1 qr. (24 rounds).	45 cwt. 2 qrs. (60 rounds).
Weight behind team—		
Mortar	38 cwt. 1 qr. 15 lbs.	Steel, 41 cwt. 2 qrs. 8 lbs.; Bronze, 43 cwt. 1 qr. 26 lbs.
Wagon	28 cwt. 1 qr. 15 lbs.	46 cwt. 1 qr. 27 lbs.
Ammunition—		
Weight	Common shell, 59 lbs.	Ring, 39 lbs. 10 ozs.
Bursting charge	10 lbs.	2 lbs. 2 ozs.
Fuze	Percussion.	Percussion.
Shrapnel—		
Weight	68 lbs. 9 ozs.	39 lbs. 10 ozs.
Number of bullets	683	475.
Bursting charge	8·7 ozs.	5·6 ozs.
Fuze	Time and percussion, 28 seconds.	Time and percussion.
Full charge	3 lbs. 13 ozs.	2 lbs.
Divided into	½ and ¼.	½ and ½.
Muzzle velocity	748 f.s.	935 f.s.
Extreme range	3,500 yards.	5,000 yards.
Rounds carried per mortar—		
With battery	92 (552).	70 (420).
With ammunition column.	96 (576).	130 (780).
In park	24 (144).	100 (600).
Total	212 (1,272)	300 (1,800)

sional troops. It is a matter of common knowledge that the German Army will in the next war be, in all probability, organized in larger units than army corps; these will, it is understood, be designated "armies," and will consist, in round numbers, of 100,000 men each.

It is believed that one or more brigade divisions of field howitzer batteries will be attributed to each of these armies, and will be considered as a force at the disposition of the Commander of the Army alone.

We may thus conclude that the new field howitzer batteries are, practically, the lineal descendants of the old batteries of position, but differ from them in the substitution of a light howitzer for a heavy gun, and in the increase (in the case of Russia) of the number of ammunition wagons. By these two changes they are made more mobile, and are thus rendered capable of keeping pace with the movements of a field army, and of taking part in the attack, whereas, if I am not mistaken, the functions of position artillery were (as its name implies) limited strictly to the defensive. They form thus an addition to, and still remain outside of, the organization of the corps and divisional artillery, being a special force available for special duties, and, as it were, a sledge-hammer in the hand of the Commander of an army, to be used by him when, in his judgment, a heavy blow is either necessary or desirable.

Appendix.

Practice with the Russian field mortar, extracted from the "Jahrbücher für die Deutsche Armee und Marine" for December, 1891.

1. In comparison with the heavy field gun, which throws a 28-lb. shell:
   Target.—Shelter-trenches, occupied by standing and kneeling dummies.
   Range.—2,130 yards.
   Projectiles.—Field gun, 24 common shell and 100 shrapnel.
   Field mortar, 12 common shell and 50 shrapnel.
   Hits.—Field gun, 37 out of 96 dummies, or 39 per cent. 176 hits.
   Field mortar, 46 out of 88 dummies, or 52 per cent. 199 hits.
   Time.—Field gun, 1 hour 15 minutes.
   Field mortar, 1 hour 6 minutes.
   The trenches were on the reverse slope of the hill, and could not be seen from the batteries.
2. Practice with shrapnel against a field work:
   Target.—A field work, 115 yards wide and 27 yards deep on the capital. Parapet, 4·6 feet high, and 13 feet thick. The work contained trenches, traverses, and blindages, and was occupied by 366 sitting dummies.
   Range.—2,350 yards.
   Projectiles.—12 shrapnel with percussion, and 50 with time fuzes.
   Hits.—98 dummies were hit, or 26 per cent., by 322 bullets and 14 splinters.
   Time.—1 hour.
3. Practice with half charges:
   Target.—The same.
   Range.—1,640 yards

Projectiles.—50 shrapnel with time fuzes.
Hits.—100 dummies, or 27 per cent., were hit by 201 bullets.

4. Practice with common shell, with half charges:
Target.—The same.
Range.—1,970 yards.
Projectiles.—100 common shell, with percussion fuzes.
Results.—56 craters, within limits bounded by two lines, one 33 yards in front of the glacis, and the other 22 yards in rear of the gorge ditch. 19 hits on the redoubt.
Time.—1½ hours.

5. Practice against a wire entanglement:
Target.—A wire entanglement, 59 feet long and 26 feet broad, covered by a glacis 5 feet high.
Range.—1,100 yards.
Projectiles.—50 common shell, with full charge.
Hits.—9 craters in front of the obstacle, 5 in it, and 13 in rear. 8 pickets were destroyed, but the entanglement was as efficient after the practice as it was before.
Time.—45 minutes.
The craters of the common shell had diameters of from 5·74 to 9·84 feet, and a depth of from 2·95 feet to 4 feet.

It was concluded from the practice that at least 5 feet of earth would be necessary for all overhead cover.

Lieut.-Gen. W. H. Goodenough, C.B., R.A.: By way of opening the discussion, I would express my opinion that as an earnest of attention being drawn to this subject, and of the possible introduction of, perhaps, a reserve of field artillery in the shape of field howitzers and mortars, we may welcome this lecture in a particular manner. I have for many years thought that we should do right in having a reserve of that kind. The necessity for it, I think, is apparent, whether in India or in countries nearer home, and whether from the examination of our own experience in wars, or from the example of foreign armies. I had not intended to make any remarks by way of criticism, but only wished to welcome the subject and welcome the lecture as an earnest of what may follow.

Major E. S. May, R.A.: With reference to what we have heard, I think the experience of all campaigns where intrenchments have been made use of has shown the value of vertical fire. Even before the days of Plevna the value of vertical fire had been recognized. I will read an extract I have taken from an article that appeared in 1885 in the Journal of the Military Service Institute of the United States, by Lieutenant Birkhimmer, in which he refers to the experience at the latter end of the American War, where vertical fire had been used. He says: "Our experience in the campaigns of 1864 and 1865 against Lee's army, securely intrenched in a chosen position, well illustrates the effective use that can be made of vertical fire. There were at first a few Coehorn mortars with the General Artillery reserve, which were gradually brought to bear against the enemy thus protected by fieldworks of strong profile. As the campaign progressed the utility of this fire, and the ease with which mortars could be transported from place to place, came more to be appreciated, until Coehorn mortars were everywhere in great demand." Then he goes on to say the Germans had solved the problem by adopting Krupp's 15 c.m. (5·9″) rifle-steel mortar. I think I am right in saying that since that time they have introduced a lighter mortar. The Krupp mortar weighed 792 lbs., and fired a shell weighing 70 lbs., with a bursting charge of 4 lbs. 10 ozs., and a range of 3,775 yards, and I think was better adapted to a siege than for use in the field. At Plevna the noticeable point was the absolute indifference with which the Turks came to regard the Russian fire; they quietly waited under cover

while the bombardment was going on, and, when it ceased, coolly went out, met the columns of assault with a heavy musketry fire, and drove them back. Lieutenant Birkhimmer, from the experience of the American Civil War, comes to just the conclusion Colonel Walford has done, namely, that a sufficient reserve of field howitzers held in the hands of the Commander of the whole forces for use as occasion might demand, would be of great use. I dare say many present will remember the way in which the German General Von Sauer has lately written about vertical fire: he is a very strong believer in it, and he goes so far as to wish to see every brigade of infantry accompanied by a battery of howitzers. Indeed, he said howitzers would probably be able to successfully engage ordinary field guns in the preliminary artillery duel. His opponents, while they combated such extreme opinions, all seem to have admitted the necessity for howitzers and vertical fire in the future, and they all agree that the best way would be to have a reserve of mortars or howitzers for use when occasion arose, in the manner foreshadowed by the lecturer. As regards shrapnel I can see there is a good deal of difficulty connected with its use, but I trust we may hope it will be overcome in due time. No doubt heavy shells falling at a very steep angle would make such deep craters that their splinters would mostly fly up in the air, and not do much damage, in a man-killing direction, whatever advantage they might be against earthworks.

Colonel W. R. Barlow, R.A.: I should like just to ask one question. I do not see anything in those tables as to the weight of bullets which the Russians employ. It is rather an important thing. Is the weight known of the bullets?

Colonel Walford: I could not say from memory, but I could find it out.

Colonel Barlow: I have no doubt whatever in future wars, shrapnel fire from howitzers will be the most effectual at moderate ranges that you can get. At a high angle of descent it is the only shell which will search out cover. Cover must be taken more every day under the tremendous infantry fire, and a velocity of, say, 1,800 f.s. from field guns for shrapnel seems to me to be of very doubtful value. I believe, by reducing the velocity very much you will reduce not only the strain on your gun and carriage, but you will also reduce the very heavy work which you have thrown on your gunners, as you reduce the effect of recoil. Even looking at that very heavy Russian howitzer, 38 cwt., behind the team, I do not see why it should not be taken over heavy ground. I have seen the old-fashioned guns at Aldershot taken over very heavy ground, and over ditches, so that I cannot see why we should limit the use of howitzers to roads. I think it would be crippling their use very much if we did. There is another point as to howitzers. Colonel Walford has given an instance where field guns were of no effect whatever against fieldworks, though howitzers were effective. Now it seems to me that if other nations are going in for howitzers which are thoroughly effective against field works, it would be a very serious condition indeed if we have not got howitzers which will meet them. I believe in having a small charge in your howitzer, and having a very large charge in the shrapnel shell; you will then always have sufficient terminal velocity, as you do not want more than 500 feet velocity to kill a man. If for the sake of gaining accuracy you dispense with a heavy charge in the shrapnel shell, you will fall into error; your bullets will not have sufficient penetration to injure men. I think that a shrapnel shell should have a heavy charge, and that of itself alone will give nearly 200 feet per second to the bullets in the shrapnel shell, thus bringing the striking velocity up to 400 or 500 feet. Personally I am deeply obliged to the lecturer who has brought this most important subject to our notice. I think that the solution of arming our horse artillery will also be found by using guns approximating to a howitzer. The lecturer pointed out that there is very little difference between the mortar and the howitzer. I go a step further, and say there is very little difference between the howitzer and the guns. I believe the howitzer with a very moderate velocity, 1,000 or 1,200 feet a second, would be most effective for shrapnel shell.

Colonel Walford (in reply): I have not very much to answer. There is, however, one thing that I should like to point out. As far as my experience goes at present, there is one very considerable disadvantage in the use of high-angle shrapnel, and that is, that at practice it is exceedingly difficult to judge from the

firing point the distance of burst. The rule for field guns, which, of course, is comparatively simple, since in that case the height of burst is not very great, and any errors which may be made will probably be inconsiderable, is of very little use when applied to high-angle fire. Since the shell may fall at an angle of something like 40 degrees, it is extremely difficult, looking from the firing point, to judge the distance of burst, while I do not myself feel certain (not having as yet arrived at a state of knowledge which would enable me to say) at what distance from the target such a shell ought to burst. In the course of some practice during last year, we obtained some very satisfactory results with shell which burst something like 200 yards short, and 120 feet above the ground. Of course, when you have to deal with distances and intervals like these, it will be almost impossible to estimate from the firing point the exact position of burst. Another difficulty in high-angle shrapnel practice will be to judge the "line" of the shell. If a shell bursts 120 feet up in the air, it must be very hard to decide whether it explodes in line with a small target. Supposing that you are firing at a fieldwork three times the length of this theatre, it would be very difficult, at a range of 2,000 or 3,000 yards, to know whether your bullets were falling into it or not. In the present state of our knowledge, it is almost impossible to be certain on this point; there is, however, no reason why we should not eventually work up to some degree of certainty, and I hope that we shall try to do so, and to get some good effect out of high-angle shrapnel. But I believe that, as has been already said, we should in practice get more real advantage out of common shell than from high-angle shrapnel. There is, again, one great objection to increasing the bursting charge of shrapnel beyond certain limits, and I am, moreover, afraid that I, personally, rather doubt whether we should ever get an increase of velocity of the bullets of 200 feet per second by means of the bursting charge of a shrapnel shell. We have found in practice that an increase of the bursting charge beyond what the walls of the shell will stand has the following result, viz., that instead of, as it were, simply vomiting forth its bullets, the shell itself opens and becomes a species of inferior common shell, covering a very large space of ground with a number of widely dispersed fragments. I am inclined to think that Continental nations will take the bull by the horns, and decide that, instead of using shrapnel, which is difficult to observe, and the effect of which is doubtful, they will employ common shell filled with some high explosive. The advantage of such a bursting charge is, that whereas the ordinary common shell filled with powder, falling at a high angle, may very possibly, and does frequently, bury itself in the ground before bursting, the splinters being consequently thrown straight up into the air (in which case they hurt nobody), the high explosive shell will probably burst before it has penetrated much below the surface of the ground, and the explosion may, therefore, do very much local damage. High explosives break up the shell into exceedingly small pieces, so that, probably, a shell so filled would, if you could arrange for the burst to take place at the right moment, be extremely destructive. There is no other point, I believe, to which I have to reply.

The CHAIRMAN (Sir H. J. Alderson): We have had a most instructive lecture from Colonel Walford, on the subject of field howitzers and mortars. It is a subject to which my colleagues on the Committee are giving their very closest attention at the present moment: but it is one which, in working out, requires a great deal of experiment and practice. On the Continent, nobody except these two, the Russian and Swiss, is yet agreed as to what is the best form to use. I think the great question of high explosives has complicated the matter; but I do not believe any nation yet really has determined to carry them into the field. Nearly every day we hear of accidents occurring with high explosives. We ourselves have been very free so far, and we hope we have got something that will answer; but at present it is premature to say anything definite about it. No doubt if we can take high explosives into the field, and use them with these mortars or howitzers, it will be of immense importance to us. I am sure you will authorize me to offer our warmest thanks to Colonel Walford for the great pains and labour he has been at in preparing his lecture, which has given us a large amount of most instructive information, and will be of the greatest possible use to those of us who are engaged in working out this question for our own Service.

Friday, April 8, 1892.

ADMIRAL OF THE FLEET SIR GEOFFREY T. PHIPPS HORNBY, G.C.B., First and Principal Aide-de-Camp to the Queen, Vice-Patron of the Institution, in the Chair.

THE ROYAL NAVAL EXHIBITION, 1891.

By Captain Sir ALFRED JEPHSON, R.N., Honorary Secretary.

WHEN asked to read a paper on the Royal Naval Exhibition I confess I agreed with a Service journal that it was an old story, yet I think that a slight retrospect of what has been admittedly a most successful and interesting affair may not be a waste of time, especially if we can draw from it some conclusions which may be useful hereafter. *Ab actu, ad posse valet illatio*—from events which have taken place we may form deductions as to those which are to ensue.

I do not think it of the slightest importance to this paper to try and trace out who first suggested the Exhibition; but H.R.H. the President stated in a speech of his that to him it was first suggested by H.R.H. the Duke of Edinburgh, and the fact of His Royal Highness having graciously consented to become our President was a matter of the greatest moment for us, for it was *per se* the first move towards success. At the outset, therefore, it is only becoming that we should acknowledge fully the great assistance we have derived from our President, who took so keen an interest in the Exhibition. Thoroughly posted in our financial and other affairs from week to week, expressing his willingness to attend meetings, and doing so when requested, and always ready to give us the advantage of his great knowledge and experience to pull us out of a difficulty or guide us when in doubt, it would be impossible for us to forget our indebtedness to His Royal Highness from the opening to the closing day, when he, as the last visitor left, addressed a few parting words to the sailors.

It was by no means clear at first of what the Exhibition would consist, and the future was perforce left in a great measure to shape itself, but—

> "There's a divinity that shapes our ends,
> Rough hew them how we will"—

and in our case we have no cause to regret the shape the Exhibition eventually assumed.

It is difficult to see how any other course could have been adopted,

for it depended to a great extent on what could be loaned or otherwise got together, supplemented by whatever a liberal and judicious outlay of money could command.

Although two years' preparation and 50 acres of ground, together with a sheet of water, would, in my opinion, have been the basis of a scheme worthy the importance of the Service, it could never be seriously contemplated, as it was considered advisable to open in the year following the Royal Military Exhibition.

There is no doubt that some few naval Officers looked on the idea with little sympathy, and for reasons which we can well understand.

It required a certainty of success, and the removal of the doubts as to whether it would be for the ultimate improvement of the men or the increased popularity of the Service.

The scheme, however, once set on foot, they joined heartily in making it go. Others, who believed it could not succeed, wrote and said how glad they were to acknowledge that they were mistaken; and, if I am correct in the identity of Captain Bowser, I had a congratulatory message even from him, of whom I may say, "Those who came to scoff remained to pray."

It is worthy of notice that, by good luck, the right set of men for each section of the Exhibition seemed not only to be available, but willing to give their services; and, looking back, it is difficult to see how the objects of the Exhibition could have been better accomplished by men other than those who gave their time to it so unstintingly.

With regard to the site there was little to choose from: Greenwich was by almost common consent vetoed on account of its distance from town, and no doubt hundreds dropped in to the Exhibition of an evening who would never (considering the weather) have journeyed down there.

Battersea Park was prospected, but never "caught on" as a site. The small distance across the river was a barrier, and in people's imagination would have put the place farther off than it really is.

An extra sixpence cab-fare has a wonderful effect in making people's minds up, for, though on pleasure bent, they have in these cases a frugal mind.

Chelsea being decided on, and having to deal with three separate bodies for the acquisition of the property, some time was spent before the necessary arrangements were concluded; the greatest difficulty being the agreement between ourselves and the Royal Military Exhibition, which entailed on us the necessity of a leap in the dark by taking over their obligations to the Commissioners of Chelsea Hospital.

It is not necessary to go into details, but, after some negotiation, an arrangement was come to with the Royal Military Exhibition authorities for about two-thirds of their original demand.

It was a good thing for us to have settled it, and not a bad one for the Military Exhibition Committee, as anyone can see by their financial statement. Major Malet, in his paper read at this Institution, says, "It was natural for the sailors to take advantage of the opportunity for an Exhibition *given* them by the soldiers."

I do not object to his way of putting it, but he did not go quite far enough, for he forgot to add—given for the consideration of 2,750*l.* paid, and at least another 1,000*l.* liability guaranteed, and since paid by us, for putting Gordon House grounds to rights. It should be in fairness added that these sums included the belongings which they would have sold by auction, and which they valued at about 500*l.*, but which, with additional property of our own, only just reached that sum.

The total number serving on Committees was 160, and some doubt might have been felt as to the harmonious working of so large a number; but the natural and easy way into which the business settled itself was, no doubt, in a great measure owing to the habits of organization which naval Officers have instilled into them at an early age. This fact did not escape the notice of H.R.H. the President, who graciously alluded to it on more than one occasion.

Few hard and fast rules were made, the Chairmen of Committees being left pretty well to their own methods of doing business; but they all worked on the same lines, and, as a broad rule, the method of official business at the Admiralty was followed. Each Committee had its own day for meeting, one day being always reserved for the Finance, which was at once followed by the Executive; so that questions involving expenditure were first brought before the Finance Committee, explanations (when necessary) given, the vote passed and sent on at once to the Executive Committee for confirmation; thus business was accelerated.

In the same way all bills were relegated to the various Committees concerned, checked by them, or the Architect, Manager, or Electrical Engineer, &c., approved by the Honorary Secretary, and laid before the Finance Committee. The members of the Finance Committee were *ex officio* members of the Executive; so also were the Chairmen of Committees. The advantage of this rule was that by attending the Executive meeting their knowledge of what was going on was not confined to their own section of gunnery, navigation, and what not, but they were in touch with the general progress of the Exhibition right through. Most Sub-Committees were again divided into many sections, their names indicating the special work they had in hand. It might be thought that so many small Committees would prove too cumbersome a machinery; but each of these sections, having only one subject to deal with, was able to concentrate all its attention to it, and so perfect its particular branch quicker than if three or four subjects were demanding its attention.

It would be unjust to them, and not in accord with the feeling of all the naval Officers connected with the Exhibition, if I did not here give expression to the sense of obligation that they are under to the various gentlemen not belonging to the Service who worked on the different Committees with them so harmoniously.

I allude not only to the Honorary Officers of the Exhibition—such as the Honorary Solicitors, Auditor, Accountant, Surveyor, and Medical Officers—but to many other gentlemen who have rendered special services connected with finance, electric lighting, the Art Gallery, and the several other sections of the Exhibition, the import-

ance of whose work it would be impossible to over-estimate, and of whose abilities and business knowledge we have reaped the full advantage.

I have not gone fully into the details of the organization and the working of the various Committees. Had I time to do so, their services would be better known. The amount of time, thought, and responsibility devoted to such parts as the acceptance or rejection of exhibits (in itself an onerous duty); the selection of what was best suited to illustrate the various conditions of the Service; the classification of the exhibits of the different sections; the compilation of the catalogue with the various prefaces; the anxiety to have in the Art Galleries only what were well authenticated pictures and relics; the increasing of the accommodation for the large number of visitors; the constant anxiety lest fire should break out and destroy what could never again be replaced—these are a few only of the duties which were cheerfully accepted by the various Committees. The financial arrangements alone occupied the constant attention of one small Committee, whose work has been so satisfactory; whilst the difficulty of getting contracts drawn up so as to meet the views of both sides was so exasperating as to imbue me with a fellow feeling for the ship's cook who, after a lively morning's visit of inspection by the Commander (now a distinguished Admiral), aired his theology and feelings at the same time by remarking that, if there was as much humbugging about in the next world as there is in this, he hoped he should go to the next one after that.

The two heaviest outlays were for the model of H.M.S. "Victory" and the water-basin. These were much debated; the latter so much and so often, that the Chairman of the Works Committee brought matters to a head by saying that it would be far better to come to a wrong decision than not to come to a decision at all.

I think it was a wise dictum, for had it been decided wrongly—to have had no water-basin, we should at once have covered the site with more buildings for exhibits; whereas, if we had delayed much longer, there would have been nothing but a piece of grass there. The fact is we hesitated at first to spend these large sums, because we had to consider the guarantors; but the bold policy was successful, and from the innate love of Englishmen for anything in the shape of water, even a boat with two or three people crossing the lake was enough to draw a small crowd.

The general wish of all connected with the Exhibition was that the public should be able to see what went to make up the fighting power of the Naval Service; hence the desire for the water, in the hope of being able to show a torpedo running, a miniature engagement—anything that could familiarize the people with life afloat.

In furtherance of this idea, it was particularly suggested by H.R.H. the President that people living far away from our naval ports should see a representation of the fighting deck of a modern ship; and this suggestion was carried out by one of the large shipbuilding firms.

The drills and sham fights carried out in the arena by the sailors and marines were a never-failing source of interest, and drew large

crowds. Doubts were expressed as to the reality of the field-pieces, one person asserting they were of wood *tinned over*; another very 'cute person saying *they were made to take quickly to pieces*, an incontrovertible fact. The running of the Whitehead torpedo and the action on the lake, and, indeed, the whole programme, from the electrically controlled boats to the diver, and the life-saving apparatus, were also keenly appreciated.

Except the "Victory," the chief points of interest where people collected (and excluding the bars) were round the Nelson relics, the lecture on the torpedo in the Camperdown Gallery, the 110-ton gun, and Clayden's models of ocean currents; also the chart engraver, who, as his head was bent low over his work, was often asked by sympathetic ladies if he was unwell.

I have purposely not alluded to the streams of people in the Art Galleries, as everything connected with that part will be dealt with by Major Edye, who is so much better qualified for the purpose than I am. I will merely state in connection with the pictures and relics that a German Admiral, sent, I believe, specially to report on the Exhibition, summed up the Art Section in the following flattering words: "In those galleries they have the history of the British Navy from the earliest period. That history is an almost complete series of triumphs, and no other nation in the world can show such a thing."

The chief characteristics of the crowds were their good nature and sobriety, and their pleasure in rational enjoyment when the opportunity and place is given to them. No malicious damage of any sort was done, and only one or two trifling articles were abstracted. Of course I do not include the light-fingered gentry, who were busy in the "Victory's" cock-pit while people were affected by the Death of Nelson Group.

As I noted the keen interest of the public in the relics exhibited, my thoughts reverted to the cramped state of this Institution, and the inability of the public to see the models, relics, &c., contained in it. If the day comes when these will be exhibited and properly classified, who knows but the owners of some of the precious relics and trophies of the Naval Exhibition may add to the value of the Institution by entrusting it with the keeping of many of these interesting reminders of a by-gone time? There could be no more appropriate place, but until we are in larger quarters, where full justice can be done to them, I fear we shall have few additions made to those we already possess.

Whilst on this subject I should like, on behalf of the Exhibition Committee, to acknowledge the great assistance we have had from this Institution. Committee rooms were placed at our disposal from November to May, the Theatre was always available for our large meetings, and everything that they possessed that was of interest to the Exhibition was freely lent to us by the Institution; in fact, I may say we stripped it to a gantline; and I know that I am giving expression to the feeling of all our Committees (especially those of Gunnery and Navigation) in acknowledging our great indebtedness

to the United Service Institution generally, and the Secretaries in particular, for their co-operation and assistance.

Except in the weather, we were fortunate in many ways. The Exhibition has the unique distinction of having opened without having borrowed a sixpence, and in having paid its way from the beginning; also we may truly say that everything was in place on the opening day.

The Exhibition was honoured by the visits of almost every member of own Royal Family, many of whom came on two or three different occasions; and several members of the Royal Families of foreign countries also visited us during their stay in England.

What accidents took place were, as a rule, not of a serious nature. One small fire occurred in Gordon House, which was quickly extinguished; and one more curious is thus reported by the Electrical Engineer: "Outside the office of Messrs. Siemens Bros., adjoining the electric light shed, this firm had erected a sign, the letters of which were made with glass tube, exhausted and filled with rarefied gas in the usual manner of Geissler's tubes. The sign was to be illuminated by the discharge of the secondary current from a large Ruhmkorff coil in the usual manner. Some of the members of the Committee being expected, it was proposed to put this apparatus in action. The primary coil was connected through a resistance as a bye-pass to one of the circuits on the switchboard, and a pair of insulated wires led from the secondary terminals to the device outside. The experiment had not been started long before the high tension secondary current commenced to spark across between the two insulated wires. This was not noticed until the sparking had heated the insulated coating so much as to cause it to smoke; once noticed, it was a simple enough matter to put a stop to, by disconnecting the wires; but before this could be done the situation was rendered somewhat dangerous by some individual amongst the visitors taking action not wisely but too well. Noticing the smoke, he proceeded to quench it by throwing on water. The result was, of course, to make an effectual short circuit at the point where the sparking had occurred, and to cause the wires to become instantly heated to such an extent as to set the wood work on fire. This was fortunately arrested before much more than the scorching of one or two match-lining boards had taken place." Soon after I received a request from this gentleman for a season ticket as a reward for what he called "putting out the fire so promptly."

The financial result, and the total number of visitors, it appears to me, satisfactorily answer the question as to whether the public appreciated the Exhibition. It was talked of in the distant parts of the country. Those who did not visit it lamented that they had lost their opportunity; and many who had seen it regretted they had not gone oftener. Every effort was made to give information by catalogue, pamphlets, and lecture, and the willingness of the sailors in charge of appliances and exhibits to answer questions over and over again was often remarked on.

The fact is there is always amongst English people an innate love for

everything appertaining to the sea—a feeling often dormant, but always there. The rush from place to place to follow each event of the programme, the desire of the programme boys to go to sea, and the questions asked so constantly, showed the interest taken in the Service.

In the Art Gallery were a set of engravings of English dockyards, about 100 years old. These were for sale. A lady called on me in much alarm lest some foreign Government should get hold of them and turn them to account when the great invasion took place.

The question arises, Has the Exhibition added to the popularity of of the Navy? If, as I am informed, the holding of the Exhibition has been to stimulate recruiting for the Service, I think that alone would justify us and repay us for our trouble; and it will be interesting to see if the increase in recruiting is kept steadily up, or whether it is merely a flash in the pan. I believe, myself, that the best method of recruiting is to let the boys be seen, and that a boy returning to his own village after six months in a training ship, well dressed, well drilled, and well fed, and with the extra amount of side he would probably put on from knowing the ship's corporal was not round the corner, would do more to attract others than any recruiting sergeant. For this reason I regret that the boys from the Plymouth ships could only be brought up to the Exhibition through the private generosity of the mother of a naval Officer, and that the Portsmouth boys, though so much nearer London, could not be brought up at all, notwithstanding the inducements we held out.

The total number of seamen and marines up for drill was 624, and of these, one man only was sent back to his ship, no other complaint of any sort having occurred, either in the grounds or barracks.

Considering the circumstances and the novelty of the situation, and the temptations to which the men were exposed both in and out of the Exhibition, this must be considered a most gratifying proof of the great change in our seamen during the last thirty years; and I think you will agree that it is due to them to place this fact on record. Many causes have led to the improvement in our men, but amongst them I have a theory that the mechanical inprovements now applied to the working of guns, the delicate and scientific instruments which they have to handle in connection with submarine mining and torpedo work, requiring skill and care to prevent accidents, have tended to make them more reflective and thoughtful, and consequently more reliable. Just as the skilled mechanic is more thoughtful and better educated than the navvy, so is the seaman of to-day superior in many ways to the man who lived in the "Flog the last man off the yard" period.

The employés of the Exhibition also were all old seamen or marines, many of whom got further employment when we had done with them. They were granted certificates of conduct, but it was a matter of regret to me that several asked me not to add the word "pensioner," as they said when this was seen they were offered less favourable wages. I hope that employers of labour when engaging our seamen will look on a pension enjoyed by a man as an extra

mark of good conduct, and that they will feel warranted in paying these men a fair remuneration and not discount their characters.

The number of visitors, as you know, was 2,351,683. The surplus profit, when made known, will, I think, compare favourably with other successful Exhibitions and form the nucleus of a new charitable fund. You are aware that with reference to this fund a special resolution was passed, long before any prospect of its existence was seen, to devote it to the one special object of relieving the widows and dependent relatives of men dying in the Service. Many applications for grants for charitable purposes have been made to us during the run of the Exhibition, and this resolution, so wisely made, has been strictly adhered to, and has prevented the fund from being frittered away in small grants to various charities, which would not much have enriched them and would have left us poor indeed.

The fund itself will be invested in the name of certain trustees (of whom H.R.H. the President has graciously expressed a desire to be one), and worked as a separate charity under a title which will always identify it with the Royal Naval Exhibition of 1891.

As it is, it will prove totally inadequate to fulfil the requirements even as a supplementary charity to Admiralty pensions, which are themselves confessedly insufficient. It is to be hoped that eventually the Navy may be placed in such an independent position that they may not have (on the occurrence of every catastrophe) to appeal to their countrymen for help; and if the public will only second the efforts we have made, and supplement this fund as it deserves, we shall soon be on the high road to that position. The fund will be worked in a practical and economical manner, much gratuitous assistance being rendered by many of those who have helped to make the Exhibition a success. It is a charity that none can cavil at, and must appeal, I think, to all who are interested in the widows and orphans of those men who go to sea for them, and who will have to stand in the first line of defence.

For comparison, I may state that at the Manchester Exhibition, 1887, there were 4,765,137 visitors; estimated surplus, 43,239*l.* The estimated surplus arising from the International Exhibition of Industry, Science, and Art at Glasgow, 1888, was 41,079*l.*; and when our balance-sheet is ready, I hope it may bear comparison with those of the Exhibitions mentioned. This will be a suitable time to mention the fact that every conceivable precaution was taken with regard to insurance, both against the accident of non-opening, against visitors' and workmen's risks, all risks to loan exhibits, and loss of gate money from having to close partially or wholly.

Altogether insurances to the amount of 370,886*l.* were effected, the amount of premiums paid being 1,353*l.* 2*s.* 5*d.* The fact that, out of this enormous amount, only 108*l.* 12*s.* 9*d.* was claimed from the underwriters is the most conclusive proof that could be given of the care bestowed in receiving, guarding, and returning the enormous number of articles, large and small, that were entrusted to our care. I shall not bore you with more statistics, except to state that the

number of letters received up to this date is about 35,000, and that the letters, book packets, &c., posted by us number 45,000.

Now that it is all over I ask myself, Could we have done any better? Of course we made mistakes; but, as the late American Minister to this country said in one of his last speeches, "The man who never makes mistakes never makes anything." I take it, there is no finality to Exhibitions; indeed, a United Service Exhibition was talked of whilst this paper was being written; but it came to nothing, its existence being of so brief and ideal a nature as to suggest to me the Baby's Epitaph. However, it is more than likely that, even in our own time, encouraged by the support we have had, and the interest shown by the country at large, another Naval Exhibition will come off.

Therefore, the records of this one may be overhauled, and if my paper leads to a discussion which will bring prominently out the mistakes we made, or any suggestions for the future, it will be of interest to those who worked at the, to us, novel undertaking, and cannot fail to be of some service to those who may follow us.

I believe, myself, in one or two cases we should have done better if we had granted concessions purely on a system of percentages on the profits, instead of taking a lump sum down, notably in the case of the Panorama of Trafalgar and the Shooting Gallery; but it is so easy to be wise after an event. A question was raised as to whether an additional charge should be made for admission to the "Victory," but this was negatived almost unanimously; and I think we took undoubtedly a great deal of the money we might have got at her gangway at the gates, and avoided any chance of complaints of extra charge.

At the same time, it must be remembered that allowing each visitor *once* through the "Victory" at 3*d.* would have brought us in roughly 29,396*l.*, and at 1*d.* 9,798*l.*

I have tried to deal with the subject of the Exhibition from a broad point of view, and have not attempted to take the exhibits in detail, as it would be an endless task, and the catalogue supplies this information. We may say it has been an experiment on the part of the Navy, and it has proved undoubtedly that your seamen may be relied on, even in the midst of the temptations of London, to preserve their self-respect; nor have I heard that their time spent up here resulted in any opinion of their Commanding Officers that they had fallen off in discipline. Of course it may be considered an innovation, and contrary to the traditions of the Service, but Lord Lorne, quoting from Canning, says:—

"Those who have checked improvement because it is innovation will one day or other be compelled to accept innovation when it has ceased to be improvement."

We live in a progressive age, and one more or less of advertisement, and must not cling too closely to tradition, if by departing from it we can add to the security of the kingdom by popularizing, in no matter how small a degree, the Service on which in time of war so much will depend.

In addition to the appreciation shown by the public of an outdoor place of harmless and rational amusement such as was afforded by the Naval Exhibition, I believe they imbibed an amount of instruction and knowledge on naval subjects which cannot fail to be productive of good; and I quote from a speech of the First Lord of the Admiralty at the opening of the Liverpool Naval Exhibition. Lord George Hamilton said he felt confident that the Exhibition would, though pehaps on a small scale, prove as great a success as the greater Exhibition held in London; and the result of the Chelsea Exhibition, both financially and as an educational instrument, had far exceeded the most sanguine hopes of its promoters. The great value of such an Exhibition was, he thought, independently of the pleasure which was given to the visitors, that it brought home to them the unrivalled position we had attained as a mercantile and commercial Power. He hoped the result of all these Exhibitions would be to bring home to all sections of the community the absolute necessity for maintaining their Navy in an effective state of strength, and that they might be instrumental in forming among men of all political parties the policy which would be continuous in its result, and which would ensure that the Navy should, both in sufficiency and efficiency, be equal to the onerous duties that in time of war and of emergency might be placed upon it.

The result of the Exhibition has forced upon me one or two considerations, which I give for what they are worth; and, first and foremost, I think it is patent that the Exhibition has justly earned the right to be looked upon as a national event, which has given the public an insight, not only into the traditions of the past, but also into the present life afloat; and they have been able to see the costly weapons, machinery, and fittings, and the countless thousands of articles which go to complete a modern man-of-war, and has thus reawakened in them the interest they have always taken in the Service, but which is apt to slumber in the piping times of peace.

It has stimulated the recruiting to a large extent, and, by affording instruction and amusement, has undoubtedly added to the popularity of the Service.

Another consideration is the great want of public ground, in an accessible situation, which could be leased at a moderate rent, be used as a recreation ground, and yet be available for these Exhibitions.

Already the cry is, "What shall we have next summer?" thus showing that the public have already acquired the habit of looking for an outdoor place of rational amusement, a habit that I maintain the Military Exhibition and our own have done much to strengthen, and, had such a piece of ground as the one I speak of been available, we should have saved for our charity, at any rate, some of the 7,854*l.* we have had to pay for goodwill, rent, restoration of grounds, and so forth.

In conclusion, whilst I may point out that I am painfully conscious of my inability to put before you anything calculated to make this paper novel or attractive, I have given you my ideas partly with the hope that in the distant future the Executive of another Naval

Exhibition (where improvements in ships and armaments that we can only dream of, or guess at by the rapid and startling changes that have taken place in our own time) may be able to say at least of us that we have tried to give the best illustration of the Naval Service of the present day that time and opportunity have allowed us.

THE ARTS SECTION OF THE ROYAL NAVAL EXHIBITION.

By Major L. Edye, R.M.L.I., Hon. (Arts) Sec.

My Lords, Ladies, and Gentlemen—Sir Alfred Jephson has in his usual terse and brilliant style given you a brief history of the Royal Naval Exhibition, and the advantages which are likely to accrue to the Naval Service therefrom, and it now becomes my privilege, with his consent and your approval, to supplement his more than interesting paper with a short, and I sincerely trust interesting, account of that section to which I had the honour of acting as Hon. Sec.

Archdeacon Farrar has very truly said that, "Art is the reflection of history; it is an illustrative chapter in the autobiography of nations." These words might well have been chosen as our motto, had we been disposed to select one, as is often the case in the formation of picture galleries having for their *raison d'être* any specific or special subject such as our Art Galleries contained, but we were content to allow art in our case to speak for itself; we preferred to allow "the consciousness of emotion in the presence of the phenomena of life and nature" to be our guide, and the foundation on which we disposed to appeal to the sympathy of a great national people who, if they have not hitherto been quite a picture-loving race, have certainly never failed to recognize and realize the magnificent heritage which has been bequeathed to them by their ancestors whose prowess by sea and doughty deeds we were anxious to depict on the walls of the Art Galleries of the Naval Exhibition.

The history of the Art Section may be briefly summarized as follows:—

As soon as the preliminaries for holding an Exhibition had been completed, and the Art Committee duly elected, it was determined under the guidance of its Chairman, Admiral Sir Edward Inglefield, to ascertain if the gallery which had been only a few months before used as the Battle Gallery of the Military Exhibition contained sufficient wall area to meet our requirements in the event of our most sanguine anticipations being realized.

At the same time a special appeal was made to Her Majesty the Queen, T.R.H. the Prince and Princess of Wales, other members of the Royal Family, my Lords Commissioners of the Admiralty, and the R.U.S. Institution for the loan of such pictures as they might respectively be disposed to sanction.

The result of this appeal, it is almost needless for me now to say, was all that could be desired, and formed the nucleus of that collection of pictures which the great naval families, public bodies, and the public themselves were destined hereafter to supplement, and which has, if I may be allowed to say so, been described as probably the most interesting and valuable collection of art treasures and relics ever brought together in so short a space of time, and by men so little versed or practised in such an undertaking.

This appeal involved the sending out of many thousands of letters and circulars, and was in its result far beyond all expectations, so much so, that our Committee were compelled to approach the Finance and Executive Committees for an increased vote, as well as for increased space.

This demand on the part of the Art Section was, no doubt, of very serious moment, and demanded the utmost consideration on the part of the Executive, especially when it was announced that the additional area required would be considerably in excess of that already granted. The proposed appropriation of this additional space by the Art Galleries naturally involved the exclusion of other exhibits from the building itself, and this consideration was one of unquestionable importance; the result, however, was the addition to the Battle Gallery of the Military (the Nelson of the Naval) of a space of equal length and breadth, but not of equal hanging area, taken from the Howe Gallery, and which was partitioned off from that gallery and the Franklin by two delicately designed screens closed at night by four Bostwick gates.

To this concession on the part of the Executive was added the Music Room of the Military (the Benbow of the Naval), a gallery that had to be subsequently lengthened to nearly double its original size within ten days of the opening of the Exhibition.

The additional space thus placed at our disposal seemed, however, to entirely melt away with the growing interest in the Exhibition which pervaded all classes of society, until the applications for permission to exhibit became so overwhelmingly large that a Sub-Committee of the Arts was appointed with powers not only of eliminating duplicate and other pictures, but subsequently of choosing from those already selected for hanging which we might be compelled to decline for want of room; the result of their report was such that still further space was absolutely necessary, and it was then decided, after due consideration and with professional advice, that thirteen transverse screens should be placed in the Nelson Gallery and a longitudinal one in the Benbow; in spite, however, even of this additional convenience, we were ultimately obliged to decline a very large number of paintings, the most painful duty perhaps our Committee had to perform during its existence, especially considering the extremely representative character from a naval point of view of a large number of those offering loans.

At this stage I may remark that, if two additional galleries similar to the Nelson and Blake had been available, they could have been filled with the very greatest facility; the space, however, at the

disposal of the Executive did not admit of any further extension, and in consequence thereof, our Committee were most reluctantly compelled to refuse some hundreds of most valuable and interesting pictures.

To naval men in particular, to the lover of the artistic and the beautiful, to the public as a body, I venture to say this was an irreparable loss, an almost pitiable sorrow, but it was in view of time, space, and public consideration inevitable, and only suggests the truism of those ideal lines,

> "To prove what amplitude in store
> Lies just beyond the entrance door."

At all times the formation of an art gallery on the loan system presents considerable difficulties, and it must not therefore be considered that because we had overwhelming offers, the Art Section of the Royal Naval Exhibition met at all times with unbounded success; it has unfortunately to regret the absence of several pictures of considerable historic and naval interest that should have been in their places, but were not so for various reasons.

The Sub-Committee of the Art Section, over which Rear-Admiral W. R. Kennedy presided, having after the most careful consideration determined on the various pictures and relics to be accepted, proceeded to the collecting and hanging of the same.

The Blake and Nelson Galleries were especially set apart for oil paintings and relics, the pictures being chronologically arranged in periods commencing with the first, *i.e.*, from the beginning of the 16th century to the commencement of the Civil War, 1642, and terminating with the 12th, *i.e.*, that between the era of the new Navy in 1860 and 1891; whilst the relics were placed as near as possible to the portraits of those to whom they originally belonged, or with whom they were in a measure intimately associated.

In this work the Committee were guided by a previously drawn up "Synopsis of Portraits, Battle-pieces, Figure-subjects, &c., with relation to prominent periods of British Naval History," which will be found on pages 20 and 21 of the Official Catalogue, as also an interesting summary of a more elaborate and perhaps unique character, being a "Chronological List of the Chief Services of the Royal Navy and Royal Marines," a compilation which will also be found in the Official Catalogue (pages 22 to 62), and which has met with almost general approval, commencing as it does with the action off Brest and burning of the good ship "Regent" in 1512, and terminating with the blockade of the Zanzibar coast in 1890 by the East Indian Squadron, under the command of Vice-Admiral the Hon. Sir E. R. Fremantle.

To Professor Laughton, R.N., Mr. Laird Clowes, and Commander C. N. Robinson, R.N., who were associated with Admiral Kennedy as members of the Art Sub-Committee, we are deeply indebted for the assistance they rendered in the compilation of these two very interesting works, which enabled the Hanging Committee with comparative ease and comfort, assisted by Mr. Frank Baden-Powell, to

arrange and place the various pictures and relics to the best advantage.

It is not intended to offer any apology for in a few cases the inartistic hanging of pictures, the want of attention to the blending or grouping of colour, nor to in many cases the want of more careful and judicious hanging of portraits and sea-pieces; we claim no artists' licence, having determined to proceed on purely chronological lines, and to trust that out of chaos a bright issue might result.

It would be impossible for me during the short space of time allotted to a lecture to give you even a very brief *résumé* of the great deeds which have made the Navy of England pre-eminent amongst all others; nor, indeed, is it within my province to do so. I may take you back to the "long ships" of Alfred, to the fact that "he was the first English Sovereign who commanded the fleet in battle, and may, therefore, be described as the first Admiral;" to Edgar, who, on doubtful authority, is said "to have claimed the title of King of the Seas;" to Canute, who "owed his crown to the Navy;" and later, to the historical part played in the naval history of this country by the Cinque Ports, first against William the Norman in 1066, and last, but not least, to the share taken by them in the destruction of the Spanish Armada.

These events are all historical; they form and are the charter of our liberties, but their path has as yet never been touched by the brush of the modern painter, and hence finds no place in our galleries.

But, although pictorially we were unable to exhibit any striking sea pictures of pre-Armada date, the very interesting series of relics lent by the Cinque Ports carry us far beyond that epoch; of these, perhaps the most ancient if not the most interesting, giving any idea of the ships of the period, was the seal of the now extinct Corporation of Pevensey. This seal (No. 2,021), the most antique of the Cinque Port seals, dating from early in the 13th century, was a splendid work of art in itself, bearing on the obverse side a ship with lofty poop and (embattled) forecastle, with the legend "Sigllv: Baronvm Domini: Regis: Anglie: de: Peuenes" ("The seal of the Barons of our Lord King of England of Pevensey"), and on the reverse two ships with their sails torn to shreds.

Thus after a lapse, we may fairly say, of upwards of nearly 700 years, the shipwright of the latter end of the 19th century was able to examine, with absolute freedom and at his ease, the form of vessel which served to make, even in the 12th century, the name of England respected by all the maritime nations of that century.

Apart, however, from the evidence of this and other seals, there were a series of charters of almost priceless value, dating from 36 Henry III (1252) to 28 Elizabeth (1586), mostly referring to concessions on the part of the Crown to the Barons of the Cinque Ports, in consideration of naval services rendered or to be rendered, but all referring to naval subjects, and each one indicating the important part played by the confederated ports chartered by Edward the Confessor, the two ancient towns added by Henry II, as well as the other towns which subsequently joined the confederation.

It is to Captain Montagu Burrows, R.N., one of our most distinguished scholars in modern history, that we are indebted in a great measure for the decision arrived at by the officials of the Cinque Ports by which this very valuable collection of treasures was placed at our disposal, illustrating, as they did silently, "The Royal Navy of the Cinque Ports," a collection which was not only the delight, but the wonder, of antiquaries and artists, and who during the whole period the Exhibition was open were ever in search of more detailed information than was perhaps accessible to them in the catalogue, and on no subject perhaps more so than in connection with the ship or burgh horns lent by the towns of New Romney, Faversham, Folkestone, Hythe, Dover, and Sandwich, which seemed to command more than ordinary interest, especially from foreigners of almost every nationality, and of whose deep interest in these unique exhibits we had constant opportunity of judging.

Of pre-Armada pictures our galleries could only boast five of any fixed date; of these the oldest was that of the portrait of Thomas Howard, third Duke of Norfolk (No. 203), Lord High Admiral of England, a member of one of the most distinguished naval families of the 16th and 17th centuries, whilst the other most noticeable was Her Majesty's picture (No. 211) of the embarkation of Henry VIII at Dover, on the 31st May, 1520, to meet Francis I of France, on the Field of the Cloth of Gold.

In the Blake Gallery this picture, I think it may be fairly said, claimed more attention than any other, not by virtue of any great apparent artistic merit, but rather owing to the quaint rendering of its subject matter.

Passing on, I think we may justly be allowed to say that the collection of portraits of Armada heroes was almost as near perfection as possible.

Lord Howard of Effingham (No. 222), his Vice-Admiral, Sir Francis Drake (No. 217), his Rear-Admiral, Sir Richard Hawkyns (No. 219), were all present, silent witnesses of the mighty struggle that took place at this period for the supremacy of the seas, whilst it may be interesting to note that these portraits were severally lent by a descendant bearing the same name.

To the Duke of Norfolk we are indebted for the portrait of the Lieutenant-Governor and Commander-in-Chief "of the Navy and Army prepared to the seas against Spain," as he was then styled; to the Lady Elliott-Drake and to Mr. C. Stuart-Hawkins we are indebted for the portraits of the two subordinate Admirals.

But we still find representatives of this great fight in George Clifford, Earl of Cumberland (No. 208), who commanded the "Elizabeth Bonaventure," a ship of 600 tons and 250 men, and who conveyed to Queen Elizabeth the despatches announcing the dispersal of the Spaniards off Gravelines; Sir Martin Frobisher (No. 224), who commanded the "Triumph;" and Sir Richard Leveson (No. 225), who as a lad of eighteen served against the Dons.

To Mr. Seymour Lucas we are indebted for that charmingly-painted picture of the surrender of Don Pedro de Valdez, the haughty com-

mander of the Andalusian flag-ship, the "Nuestra Senora del Rosario" (No. 223), a subject which he has treated with such dignity and accuracy of detail.

Loutherbourg, Admiral Beechey, and Mr. Frank Baden-Powell have each furnished pictures giving different periods of the great 16th century struggle: Loutherbourg, the fight itself (No. 212); Admiral Beechey, the part played by the fire-ships (No. 221); whilst Mr. Baden-Powell, in a painting full of colour, detail, and almost life-like character, puts in "Our Last Shot" (No. 226), prior to the home fleet hastening back to England to avert the fury of the rising gale, which was bound to complete the destruction of the retreating remnants of Spain's mighty efforts to sweep the English Fleet from off the seas.

Amongst those who played an important part in the naval history of those days, we must not forget Sir Walter Ralegh (No. 209), Thomas Cavendish (No. 218), Robert Devereux, Earl of Essex (No. 213), and Sir Hugh Willoughby (No. 220), all of whom were duly represented.

I have dwelt somewhat longer perhaps on this Armada period than is consistent with the limited time at my disposal, but if so I would claim your indulgence in view of the important part it played in the history of our country, and to explain that it was the desire of our Committee to emphasize to our visitors that period which might be described as the dawn of our permanent navy.

From the year 1588 (which includes the Cromwellian era) to 1660 there is much to record. Blake (No. 227), Ayscue (No. 235), Penn (No. 245), Lawson (No. 231), Monck (No. 249), and Deane (No. 233) waged dire strife against Holland and Spain; of Blake there were two portraits differing considerably from each other; one lent by the Wardens and Fellows of Wadham College, Oxford, of which University Blake was himself a graduate, whilst the other was lent by a descendant in the female line; the remaining portraits being lent by my Lords Commissioners of the Admiralty.

The wars of the Restoration era (1660—1688) gave us a Royal Duke as a Lord High Admiral (No. 256); a Percy of similar rank (No. 236); Tyddiman (No. 237), who as a Vice-Admiral failed in his attack on Bergen; Myngs (No. 238), who was killed as a Vice-Admiral whilst gallantly leading Prince Rupert's division in the memorable fight off the North Foreland; Sir Joseph Jordan (No. 240), who was an Admiral at Solebay; Edward Mountagu, Earl of Sandwich (No. 242), who perished in the battle of Solebay, where his flagship, the "Royal James," was blown up with a loss of nearly the whole crew; and a host of other distinguished men, all of whom found a place on the walls of the Blake Gallery, and whose names will ever remain green in the memory of all true sailors. In connection with many of the names I have mentioned, there are two very interesting facts, one of which certainly should be recorded, whilst the other is only of passing interest.

In "Pepys' Diary" (1666), vol. ii, p. 385, he writes as follows:—

"To Mr. Lely's the painter's and there saw the heads—some

finished and all begun—of the flagg men in the late great fight with the Duke of York against the Dutch.

"The Duke of York hath them done to hang in his chamber, and very finely they are done indeed. Here are the Prince's (Rupert), Sir George Asku's, Sir Thomas Teddiman's, Sir Christopher Myngs', Sir Joseph Jordan, Sir William Berkeley, Sir Thomas Allen, and Captain Harman's, as also the Duke of Albemarle's; and with he my Lord Sandwich, Sir William Penn's, and Sir Jeremy Smith's."

Thus are preserved to us, painted by one of the most distinguished artists of the day (Sir Peter Lely), a veritable autobiography on canvas of those men who against the Dutch Admiral Opdam's mighty fleet maintained the honour and supremacy of England's flag.

When these pictures were handed over to us, they were in due course hung, the names of the several representatives being clearly painted in black letters on gilt tablets, which were attached to each frame; none of our staff had any idea of any inconsistency existing amongst them, and it was not till our first dusting day by professional cleaners that it was discovered that Admiral Myngs had changed frames with Admiral Tyddiman; how long this imposture had been going on it is impossible to say, but it may have been for years.

The other picture of this period which deserves some notice was a fine painting, 12 ft. by 8 ft., by an unknown artist, and entitled "The Embarkation of Catharine of Braganza to marry Charles II of England" (No. 260); it had an insurance value thereto attached of 500*l.*, and was hung on the line next to another, the Battle of Solebay (No. 262), lent by the Earl of Sandwich, and painted by Van de Velde. It was the fate of both pictures to be in close juxtaposition to one another by virtue of their dates, and it was perhaps lucky that it was so, for as soon as a careful study of each picture had been made, it became self-evident that both pictures were by the same artist; the treatment of colour, water, design of ship, their form, decoration, rig, &c., all spoke for themselves, and the unknown artist was almost unanimously declared to be Van de Velde, a decision which I am sorry to say in the interest of the Exhibition raised the insurance thereon from 500*l.* to 5,000*l.*

Coming to the 4th period, we find Sir John Leake (No. 232), who commanded the van at Malaga; Sir George Rooke (No. 254), who captured Gibraltar in 1704; Sir Clowdisley Shovell (No. 257), who perished with all his crew off the Scilly Isles in 1707; George Legge, First Lord of Dartmouth (No. 259), who died in disgrace in the Tower; Sir Robert Holmes (No. 264), who took New York; and Samuel Pepys (No. 265), the diarist. It was a period of comparative rest, although the battles of Bantry Bay, Beachy Head, La Hogue, Vigo, Malaga, and the taking of Gibraltar are notable landmarks.

It was also during this period, as may have been seen, that Captain Kempthorne (No. 283) fought his celebrated action single handed with seven Algerine pirates, which has been immortalized in the following lines:—

"Two we burnt, two we sank,
And two did run away,
And one we carried to Leghorn Roads,
To show we'd won the day."

The struggle between the English fleets and those of France and Spain continued during the 5th and 6th periods, and contributes the usual number of distinguished men to the walls of our galleries; amongst them we find George Byng (No. 294), afterwards Viscount Torrington, who entered the Navy as a "King's letter boy," and who afterwards gained the brilliant victory over the Spanish fleet off Cape Passaro; Sir John Balchen (No. 295), lost in the "Victory" off Alderney in 1744; Benbow (No. 303), who was mortally wounded in his action with the French Commodore du Casse; Admiral Thomas Mathews (No. 306), who was tried by Court-Martial for allowing a French fleet to escape, and found guilty; Edward Vernon (No. 310), who captured Porto Bello, and was as an Admiral afterwards struck off the list; Admiral Thomas Smith, "Tom of Ten Thousand" (No. 311), as he was called by the men, President of Admiral Byng's Court-Martial; Edward Boscawen (No. 315), who reduced Louisbourg; and Admiral George Anson (No. 321), who was raised to the peerage for his defeat of Admiral de la Jonquière off Finisterre.

These and many others whose names are too numerous to mention had each their respective places in our galleries.

Of sea pieces of this period, one, a charming little painting, "The Taking of Porto Bello" (No. 312), by George Chambers, illustrates the want of care sometimes exhibited by artists in painting naval and military subjects, for here we have the ensign shown by each of the English ships engaged as that authorized by the Union in 1801, whereas the action itself was fought in 1739, or nearly three-quarters of a century before.

To chronicle the events of the 7th, 8th, and 9th periods is an almost impossible task, except to point out that nearly all the most distinguished naval Commanders of the period were duly represented, including Sir Edward Hughes (No. 336), who fought five distinct actions with the French Admiral Suffren; Hawke (No. 340), who defeated Marshal Conflans in Quiberon Bay, and subsequently became a peer for his distinguished services; Admiral Viscount Keppel (No. 342), who commanded the "Valiant" at the Battle of Quiberon Bay; Samuel Barrington (No. 351), who reduced St. Lucia, and defeated the French under d'Estaing; Lord Rodney (No. 357), who obtained a signal victory over De Grasse in 1782; Captain James Cook (No. 358), the renowned circumnavigator; Kempenfelt (No. 364), who was lost in the "Royal George" at Spithead; Samuel Hood (No. 366), who commanded the "Zealous" at the Nile; Hyde Parker (No. 317), who was lost with all hands in 1783, and Thomas, Lord Graves (No. 334), who was second in command on the memorable 1st June, 1794.

Of the more renowned men of this period it is impossible to go into details; the lives of most of them have been fully written, and it would take a far more able pen than mine to even draft the shortest

précis of their respective careers; it must be sufficient, under the circumstances, if I merely refer to them as Lord Howe (No. 332), Viscount Bridport (No. 399), the Earl of St. Vincent (No. 375), Viscount Duncan (No. 441), Lord de Saumarez (No. 380), Sir Robert Calder (No. 401), Lord Collingwood (No. 407), Sir John Duckworth (No. 417), Lord Hood (No. 399), Lord Dundonald (No. 498), Viscount Exmouth (No. 412), the immortal Lord Viscount Nelson (No. 570A), remarking that all were duly represented, and in nearly every case by the most distinguished artist of their day.

Before closing this list treated so summarily as regards their great deeds, I must not fail to mention the fact that the portraits of living Officers were strictly prohibited, and that this decision was rigidly adhered to in every case; indirectly the portrait of one Officer did appear to the very last, but, although such was the case, it was entirely through an oversight on the part of the Hanging Committee.

A few distinguished men have occupied public attention between the Nelsonian era and our own, such as Bounty Bligh (No. 402), Sir Robert Stopford (No. 397), Sir Charles Napier (No. 571), Sir Michael Seymour (No. 463), Sir George Martin (No. 480), Sir George Cockburn (No. 490), Lord Dundonald (No. 498), the hero of the "Shannon," Sir Philip Broke (No. 613), Sir Byam Martin (No. 621), Lord Lyons (No. 633), Sir William Parker (No. 639), Sir William Peel (No. 642), Sir James Hope (No. 750), and last, but not least, the pioneer of Lord Wolseley's advance on Tel-el-Kebir, poor Wyatt Rawson (No. 746), who thus brings to a close the twelve periods into which the history of the Navy was divided by our Committee.

Turning to the sea or battle pictures, it will be an interesting fact to note that no less than five paintings by Van de Velde, which were on view, were recovered after a lapse of many years from the annual attentions of the whitewasher—I refer to those lent by the Mayor and Corporation of Sandwich (Nos. 261, 268, 269, 270, and 271 in the catalogue), which were discovered some sixty years ago behind the plaster of an old house in Harnett Street, Sandwich—whilst another curious old painting (No. 210) seems for years to have found a temporary home in Canterbury Cathedral. Of this class of picture, those to which most attention was paid by the public in general were the "Destruction of the French ships in the Bay of La Hogue" (No. 296), lent by the Duke of Westminster; Colonel Cornwallis West's three exquisite pictures (Nos. 475, 476, and 477) by Gilbert, of the retreat of Admiral Cornwallis under conditions creditable to himself and his country; Commodore Nelson boarding the San Nicolas (511) followed by a detachment of the 69th Regiment then serving as marines; Nelson boarding the "San Nicolas" and "San Josef" (Nos. 514 and 517) respectively; Nelson receiving the swords of the Spanish Officers on the quarter-deck of the "San Josef" (No. 522); Harry Coll's characteristic picture (No. 552) entitled "Daylight;" the "Lion's Cubs" (No. 651), by F. W. Lawson; "The 'Victory' taking possession of a prize" (No. 599), by W. H. Overend; M. Ballin's two charming pictures

(Nos. 608 and 616) lent by the Trustees of the Royal Naval Club, Portsmouth; and, lastly, with all its historic faults, Maclise's well-known picture (No. 586) of the death of Admiral Lord Nelson, around which there was always a dense, sympathetic, and admiring crowd.

But distinguished as were the men who were thus depicted on our walls, the collection was not only unique in its historical interest, but it was little less so in artistic merit, having representative works of such masters as Abbott, Dahl, Gainsborough, Hogarth, Holbein, Hoppner, Sir Godfrey Kneller, Sir Peter Lely, Sir Thomas Lawrence, Loutherbourg, Mytens, Opie, Sir Joshua Reynolds, Romney, Raeburn, Serres, W. I. M. Turner, the two Van de Veldes, Volpe, Vandyck, Benjamin West, Zucharo, and a host of other artists of the highest professional attainments.

Passing from the Blake and Nelson Galleries to that of the Benbow is merely a transition from oil to water colour, mezzotint, engravings, and prints of what has already been noted in the other galleries, but with hundreds of additional portraits, battle pieces, &c. To Messrs. E. and E. Emanuel, of Portsea; the Trustees of the British Museum; Sir J. Campbell-Orde; Lord de Saumarez, and Mr. R. J. Roddam, our Committee are deeply indebted for the best individual collections, that of the first-named being not only the largest, but certainly the most choice.

Coming to the water colours section, we find Her Majesty, H.R.H. the Prince of Wales, Admiral H.R.H. the Duke of Edinburgh, the Earl of Dundonald, Admiral Sir Edward Inglefield, and Staff-Commander Bedwell the largest contributors; whilst, as regards artists, those most prominent were Van de Velde, Pocock, Schetky, Sir Edward Inglefield, Sir O. Brierly, W. L. Wyllie, Le Chevalier de Martino, O. Norrie, E. W. Cooke, J. R. Wells, and W. F. Mitchell.

The catalogue (if we may be allowed to say so) is so complete in its text as regards the Art Section, and the press have been so liberal in their several reports, that I feel I should only be repeating matter if I were to go further into details on this subject; but when we come to the section containing the humorous side of the Navy, I venture to trust I may be granted the indulgence of trespassing on your patience in mentioning that to Mr. J. Grego, with whom I will associate the names of Commander Robinson, R.N., and Mr. J. Pearson, the Naval Service owes a deep debt of gratitude for the loan of these pictures, which have illustrated to us what a fund of talent for the ridiculous existed in the good old war days, and how every subject, even then, had two sides of the question—the humorous as well as the serious.

The vicinity of these paintings, &c., mostly by Rowlandson, Gillray, Morland, and Cruikshank, was always the centre of a large crowd of admiring spectators, who seemed to appreciate these quaint old representations of an equally quaint and characteristic age.

So quaint, indeed, and so supremely characteristic were these sketches of the customs of the day, that though humorous, and extravagantly exaggerated, they nevertheless seem to convey most un-

questionably the peculiar conditions of the Service as existed when the brush gave them birth.

To the student of all details connected with the Navy, and especially of portraits, there was one subject upon which it was hoped the Exhibition would, at least, have thrown some additional light, but it would appear that little is to be gleaned thereon and nothing less than printed regulations, if they exist, are apparently of much avail.

I refer to the uniform or livery worn both by Officers and men in years past.

Of the Officers' dress on board ship prior to the introduction of uniform the pictures tell us very little; many of our Admirals are painted, not in their work-a-day rig, but in Court attire, obviously unfitted for sea and ship wear.

It appears, however, that something approaching uniformity had been arrived at prior to 1748, and that the first uniforms were modelled on existing garments, although blue, and white as facings, were substituted for such colours as may have been previously in use.

There was apparently no uniformity up to 1748, and as four important changes took place in the dress of Officers between that date and the end of the century, the absurdity of which Christian Symonds and other modern artists are guilty in labelling their pictures "Admiral of the 18th Century," or "Captain of the 18th Century," is obvious.

The fact that the portraits were labelled with the highest rank held by the person depicted, instead of with the rank held when the picture was painted, is calculated to give rise to totally erroneous ideas on the subject of uniform; No. 332, for example, showed Lord Howe when he was a Captain in the earliest uniform, and was probably painted when he was Captain of the "Magnanime" after Quiberon Bay; in another picture (No. 350), we see him in the uniform of an Admiral of the Fleet (1795—1812), so that it is necessary if we want to know how he was dressed on the glorious 1st of June to look for a third picture, and this we find in No. 546.

The embroidered coats, as sanctioned for Flag Officers in 1748, of which no example apparently exists, but which is described in the "Nautical Magazine," are worn by "Tom of Ten Thousand" (No. 311), the Hon. Edward Boscawen (No. 315), Lord Anson (No. 321), Sir G. Pocock (No. 354), Viscount Barrington (No. 351), Sir F. Geary (No. 327), and Lord Hawke (340).

The portraits of Lord Graves (No. 334) and Admiral Keppel (No. 342) show modifications which seem to indicate that the alterations ordered in 1767 were taking effect, while in Sir Hyde Parker's picture (No. 317) we curiously enough see a mark on the sleeve which did not become regulation until after his death.

Some of the earlier Captains' uniforms are shown in the following, and the date of their commission in that rank given in the biographical notices of the catalogue shows the period to which they respectively belong:—Howe (No. 332), T. Saumarez (No. 322), Shirley (No. 359), Earl of Bristol (No. 360), Roddam (No. 363), Jervis (No. 368—Hopp-

ner's picture), that by Sir W. Beechey shows him as an Admiral of the Fleet (1812—1825) when white facings had again been added to the uniform (1795—1812).

Some very doubtful uniforms are those of Lord Sandwich, Kempenfelt, and William IV.

It is worth while noting that, as a rule, only two kinds of dress were prescribed until quite a late date, full dress and frocks, and twice, viz., in 1767 and 1827, full dress was itself abolished, and the frock, with some little alteration, made the only dress, except a rough weather one. With comparatively few exceptions, men were painted in full dress, the exceptions being usually in favour of a dress worn in battle; Nelson's portrait (No. 585) in West's well-known picture is painted in the Rear-Admiral's frock he wore at Trafalgar, but in Hoppner's picture he is in the full dress of his rank, a dress in which Lord Collingwood appears in No. 407.

It may be noted that, taking the better known portrait painters like Gainsborough, Reynolds, and Hoppner, the dress usually conforms to the regulations, while in the work of others there is a tendency to put in laces and buttons which had no existence in fact.

Of junior grades wearing uniform at this period, in No. 464 will be seen several Officers of Lieutenant's rank which are absolutely correct as regards uniform; and here it may be remarked that, wherever Loutherbourg has introduced figures, they are invariably found dressed in their proper livery; No. 467 shows Sir Graham E. Hamond as a Midshipman of the same date.

On the other hand, Mr. Westall, who painted a number of pictures of episodes in Nelson's life (Nos. 479, 524, &c.), allows himself apparently any amount of latitude. He may be correct in his manner of dressing his figures, but he is certainly at variance both with other painters and with the regulations of the period.

A very notable change took place in the dress in 1795, when white facings or lappels disappeared; the order for this alteration does not appear to exist, and although search has been made for it in the Annual Register and other contemporary prints, cannot be traced. The paintings in the Exhibition, however, fully corroborate the belief that some such order was issued, for at the date of the battle of the 1st June, 1794, the Officers are shown with white lappels, whereas, at the date of the battle of the 14th February, 1797, they are shown without them.

Of the uniform of 1795—1812 for Flag Officers, Captains, and Lieutenants, there were many examples in the Exhibition, those of Lords Collingwood and Keith as Flag Officers, Blackwood and Hamilton as Captains, and the Lieutenants in the Nile and Trafalgar pictures were amongst the best specimens.

The uniform instituted in 1812 is the first of which we get minute details, for in 1825 the regulations were issued in book form with plates, Nos. 1,135–42 (these plates were shown by Messrs. Gieve, the naval outfitters, who picked them out of a dustheap some years after they were issued). They were only in force for two years, new instructions being issued in 1827, but they have been largely drawn

upon by artists, and have been the cause of a plentiful crop of errors, for, as a matter of fact, the plates differed considerably from the uniforms with which Officers had supplied themselves in 1812, as anyone may see by comparing them with the pictures of Captain Broke (No. 613) and Lieutenant Sutton (No. 587).

Concerning the costume of the seamen, there is very little to say. Every Naval Officer present is aware that the British bluejacket had no recognized uniform until 1857, although long prior to that date, something like practical uniformity is supposed to have existed, owing to the necessity the seaman was under of obtaining his clothes from the purser. This practice dates from the reign of James I. There was very little indeed on the walls of the Exhibition to give support to this assumption, which also gets a nasty shake, by the way, from Captain Glasscock, who, in his note-book, says, "So much does Jack abhor a purser's shirt and jacket, that for anyone to be seen in them but a 'waister' was, all last war, considered a fair subject for banter and reproach." On the other hand, there is this to be said, that in every picture representing anything in the nature of a sea ceremony, such as Royalty, or a Flag Officer going on board ship, other visits of importance, or such functions as launches, funerals, and the like, the men in the boats are invariably shown dressed alike, and frequently with badges on their arms, as in the case of the crew of Anson's galley, when he went up to Canton, and watermen on the Thames up to within a few years since. For this reason, and because there is much corroborative evidence in books, we might be inclined to think that in the matter of the costume of the men it would be delusive to trust entirely to the figures in the battle pieces, so lately to be seen at the Exhibition.

It is not, however, until we reach the subject of relics pure and simple that our difficulties commence; how out of such a mass of priceless treasures are we to discriminate that which most appeals to our senses; each article has its own merit, each is prized as a gem by its owner? Each is a portion of the history of the Service, and the whole grouped and subdivided into periods, represents the several stages of the naval history of this country.

If we turn to the plate, does not each exhibit speak for itself, does not each article in nearly every case represent the grateful acknowledgment of a grateful people for some victory gained or daring and gallant deed, as evidenced by the munificent gifts presented from time to time by the City of London and Lloyd's Patriotic Fund? Apart from these there are exhibits which, although they do not represent any distinct act or deed, are nevertheless of intense national interest. To the Lady Elliott-Drake we are indebted for the loan of Sir Francis Drake's silver drinking cup (No. 1,929), as also a silver plaque (No. 1,930), engraved on both sides, showing the circumnavigation of the globe by that distinguished sailor. To this section of exhibits, Lord Exmouth contributed no less than three magnificent pieces of plate —a silver gilt centre piece (No. 1,967) presented by the nation to Admiral Viscount Exmouth in commemoration of his services at the Battle of Algiers, the Tarnick Vase (No. 1,968), presented by his

Officers in the Mediterranean, and the Marseilles Plate (No. 1,969), presented by the town of that name as a testimony of its gratitude. The hero of Trafalgar was also represented by a multiplicity of articles, of which we may mention the casket presented with the freedom of the City of London (No. 1,974), a gold box with the freedom of the City of Oxford (No. 1,976); as well as a host of other articles presented amongst others to the Earl of St. Vincent and Lord Collingwood.

But although we have all these mementoes of a period of anger and strife, there were to be found amongst others three trophies, emblems, if I may say so, of a more peaceful era: (1) the magnificent collection of ships, &c., belonging to H.R.H. the Duke of Edinburgh (Nos. 1,978—2,006); (2) the splendid solid silver testimonial presented by the French Government to Mr. Larkins (No. 1,922) as a mark of their high esteem of his labour for the promotion of the International Code of Signals; and (3) the Jubilee Offering of the Royal Navy and Royal Marines to Her Majesty the Queen in 1887 (Nos. 2,008—2,009).

Concerning these models, constructed in pure and standard silver, much has already been written, and the catalogue is so elaborate in its description of them as to need little addition on my part to explain the intricate, delicate, and accurate details of their construction, which occupied close on two years.

They were presented to Her Majesty at Osborne in commemoration of a long and auspicious reign of fifty years: the one typical of the line of battle-ship in use at the accession of Her Majesty, the other a specimen of the large and formidable battle-ship of the year 1887.

Turning to the official papers, we find a mine of wealth; but I must preface any remarks I may have to make thereon by expressing how grateful our Committee were for the valuable assistance received from Mr. T. E. Hodgkin, F.S.A., and Mr. G. Pritchard by the loan of their very choice collections.

Amongst those lent by Mr. Hodgkin, we have a curious "Estimate of the Charge of Victuallinge Her Ma^{ts} (Queen Elizabeth's) Shipps in Harbor the monethe of June, 1601," by which we learn the seamen were paid 6½*d.* per diem, and the "pryncipall maister" had 5*s.* per week board wages (No. 2,025); a holograph letter from Captain Roger Martin (No. 2,037), whose death is mentioned by Pepys ("Diary," 1st August, 1666) is also interesting, it is a curious effusion, and complains he has no pilot on board "nor any beare but what doth stincke." Amongst the collection may be found contemporary portraits of George Monck (No. 2,033); Martin and Cornelis Tromp (Nos. 2,038 and 2,068); Sir George Ayscue (No. 2,040); Sir Christopher Myngs (No. 2,062); Sir John Lawson (No. 2,044), all stated to be the earliest prints of them known; Lord Sandwich (No. 2,047), the "My Lord" of Pepys; James, Duke of York (No. 2,050); Samuel Pepys (No. 2,101), used only as his ex-libris, and very scarce; and a beautiful portrait of Prince Rupert (No. 2,074) when young, by Symers after Van Dyck; whilst of Mr. Hodgkin's collection of autographs and broadsides nothing can be said but praise.

Mr. Pritchard's collection of autograph letters of the most distin-

guished Admirals of the Service, from George Clifford, 3rd Earl of Cumberland, dated 23rd September, 1586 (No. 2,116), asking Queen Elizabeth for a loan of 10,000*l.*, to that of Admiral Sir Michael Seymour, dated 20th February, 1856 (No. 2,189), are first and last.

The intermediate letters are just as interesting. We have amongst them one of the Earl of Nottingham (No. 2,117B), giving us in 1601 the charges for our dockyards; one from Blake and Monck, in 1653 (No. 2,120), asking Captain Holman "an account of what prisoners you have on board, and the names of the Dutch captains, if you have any;" another from Rupert and Albemarle, 1666 (No. 2,121A), authorizing Admiral Kempthorne "to weave a blew flag on the mizentopmast head;" another from Admiral Sir John Norris, who, in 1730–31 (No. 2,131), asks for Sir Clowdisley Shovell's sister's son to be promoted in the Service, pathetically remarking, "the only relation he has left at sea;" one from Captain George Vancouver, dated 1793 (No. 2,145), being a signature to an account of stores expended to salute the King at his giving up the island (Owhyhee) to His Britannic Majesty; "made a present to the King by order of Captain Vancouver, one drum complete; burnt for the entertainment of the Chiefs sky and water rockets;" the last letter (No. 2,160) Lord Nelson wrote before leaving English soil, dated "the George Inn," Portsmouth; and lastly, Captain Pipon's report (No. 2,169) of the finding of the home of the mutineers of the "Bounty," at Pitcairn Island. It is needless to remark that the perusal of these and many others form in themselves a charming and interesting chapter of our national history.

To Messrs. L. and J. Parnell we are also much indebted for a very interesting series of "London Gazettes," commencing with an account of the launch of the "Edgar," in 1668 (No. 2,190), to the capture of the French ship "Généreux," bound to Malta, in 1800 (No. 2,225B), with troops and other stores.

The value of the individual contributions can, perhaps, be hardly realized. Amongst them we have the return of stores of the "Raynbowe" (No. 2,227), one of the largest vessels which served against the Armada, as also the "booke of all the vyttayling and all other charges bestowed upon the 'Crescente' and 'Hart'" ships (No. 2,229), which formed the Dartmouth contribution to the English fleet to serve against the Armada, giving the names of the Officers of each ship; Admiral Byng's last letter (No. 2,272) to his sister (the Hon. Mrs. Osborne), "I can only with my last breath thank you over and over again for all your endeavours to save me," as well as the justification of his conduct (No. 2,273) made a few minutes prior to his execution, in which he remarks, "Happy for me at this my last moment that I know my innocence, and am conscious that no part of my country's misfortunes are owing to me;" Captain Cook's Journal (No. 2,279), compiled during his first journey round the world, 1768–71; the draft Convention of the Treaty of Copenhagen (No. 2,325), with original marginal notes of Lord Nelson's; the rough signal book of the "Naiad" (No. 2,333), repeating frigate at the battle of Trafalgar, containing the celebrated signal, "England

expects that every man will do his duty;" a log of the weather, in Lord Nelson's handwriting (No. 2,356), from May, 1805, to October 20th, 8 P.M.—his last entry; the signal book of the United States frigate "Chesapeake" (No. 2,372), with bullets attached for sinking it in the event of the ship being captured; a letter (No. 2,373) dated United States frigate "President," taken in United States ship "Chesapeake," with a note thereon, "Enclosed you will receive a copy of certain British private signals;" Bligh's diary (No. 2,401), with notes of observations during the forty-eight days he was in the "Bounty's" launch.

Of Nelsonian letters and papers there was a very large collection, some of official and others of social interest, whilst many were more interesting from their quaint style than from any other consideration. The first I will quote you (No. 2,287) is characteristic of his determination, and is conveyed in a letter to the Governor of St. Eustatius, in the West Indies, and dated from on board the "Boreas," stating that "if a salute of at least as many guns as that given to the French is not paid to the British flag, I must suppose it is an intended insult, and such an insult as I am sure will be properly attended to and noticed;" the original memorandum given by Lord Nelson to the curate of St. George's, Hanover Square (No. 2,302), after the loss of his arm, wherein he remarks, "An Officer desires to return thanks to Almighty God for his perfect recovery from a severe wound, and also for the many mercies bestowed on him;" another (No. 2,331), wherein he remarks, "When I run over the undermentioned wounds, eye in Corsica, belly off Cape St. Vincent, arm at Teneriffe, and head in Egypt, I ought, I think, to be thankful what I am;" to these I think I might add the letter (No. 2,354) of Earl Nelson, referring to his brother Admiral Nelson's body, "I cou'd have wished to have known what was done with ye bowels, whether they were thrown overboard, or whether they were preserved to be put into ye coffin with the body." But, perhaps, of all the references to which I have drawn your attention, none will appeal more to us as members of a profession to which he was so much endeared, as the note from Mr. Bentham to Mr. Kee (No. 2,280) introducing young Horatio Nelson to the purser of the "Seahorse," dated the 28th October, 1773, Mr. Bentham would "be obliged to him for a recommendation in favour of Horatio Nelson, a young lad, nephew to Captain Suckling, and who is going in that ship." Contemplate the events which took place between the date of this letter and 1805, and then realize what share in the world's history this young lad played until, in the cockpit of the "Victory," he breathed his last, at the zenith of his fame, illustrious and beloved by all.

There were yet two letters of interest, which I venture to think should be quoted, as they settle any probability of a controversy on the subject in the future. No. 2,296 in the catalogue is a letter lent by Mr. Edward Dames, and claims to be the first writing of Nelson, after the loss of his right arm. Now on this point there can be no doubt, as evidenced by No. 2,299 (lent by Sir W. Biddulph Parker), a letter written by Sir Horatio Nelson, as he then was, to Sir John

Jervis (afterwards Earl St. Vincent), "I hope you will be able to give me a frigate to convey the remains of my carcass to England." "You will excuse my scrawl, considering this is my *first* attempt."

Of snuff boxes, perhaps the choicest was that lent by the Rev. E. Stanley Carpenter (No. 2,423), presented to Captain Edward Carpenter, R.N., after the battle of Navarino; the most historical, perhaps, an oak box (No. 2,447), made from wood of the "Mary Rose," sunk at Spithead, in 1545. The Earl of Northesk contributed twenty-four boxes made from timber or fittings of various old men-of-war mostly engaged in the battles of St. Vincent and Trafalgar, whilst presentation boxes to Lord Nelson, Lord Exmouth, Lord Collingwood, and Lord St. Vincent were amply *en évidence*. None could have visited the Exhibition without admiring the splendid collection of British war medals and decorations, &c., lent by Captain A. E. Whitaker, of the Northumberland Fusiliers. It would be impossible to attempt to describe them, and presumptuous for any one to do so but the owner, who, in a specially printed volume, two copies of which were always at the disposal of visitors to the Exhibition, gives a complete description of each medal, its former owner, and the cause of its award. Of those lent from other sources, perhaps the most interesting belonged originally to Admiral Viscount Nelson (Nos. 2,488—2,499), lent by General Viscount Bridport; whilst Mr. J. G. Murdock added a most valuable collection of commemorative medals. But here again we have a subject in itself, and it is consequently hardly fair to particularize amongst so many exhibits of the utmost value, publicly as well as privately.

In the same manner, taking the list of active service swords and dirks, are they not silent witnesses of what they have each done, and who can tell the trouble many of these now carefully treasured weapons have caused to many a family circle? Of presentation swords there were quite a host, each one speaking on the blade for itself; but of all present, none, perhaps, were of such historic value as the three swords lent by Mr. C. Collingwood Denny (Nos. 2,658, 2,659, 2,660), the swords of the French Admiral Villeneuve, the Spanish Vice-Admiral Alava, and the Spanish Rear-Admiral Cisneros, surrendered to Admiral Collingwood at the battle of Trafalgar.

Beyond these subjects we cannot trespass; to attempt to deal with the relics that were exhibited at the Exhibition is a matter of absolute impossibility, and only to be done in a lecture by itself. Under the circumstances, all that remains for us is to ascertain what is and has been the effect of this exhibition of naval pictures and relics to the people of this our home and country. I do not hesitate to say that no one can possibly calculate the good it has done; the amount of *esprit de patrie* it has created is simply incredible, and perhaps at no period of the country's history has the Naval Service been so popular as it is at the present moment. It is beloved by all, and so long as we can secure the affections of the people, we may rest assured that we have nothing to fear from the terrors of our enemies.

Before concluding, I venture to give you a few statistics, which I

trust may interest you, and which will, I think, be substantial proof that the department had some work to do.

The total number of art exhibitors was 1,022, and the number of exhibits 4,939, including 755 oil paintings; 780 engravings, prints, and mezzotints; 318 water colours; 117 miniatures; 88 pieces of presentation and other plate; 558 maces, charters, autographs, official and private letters, &c.; 69 presentation and other snuff boxes; upwards of 1,500 decorations, medals, and tokens; 158 presentation swords; 44 pieces of sculpture; 76 pieces of china; and 476 miscellaneous relics.

Of oil paintings, 138 were assessed at a value of between 50*l.* and 100*l.*, 279 of from 100*l.* to 500*l.*, 43 of from 500*l.* to 1,000*l.*, 21 of from 1,000*l.* to 5,000*l.*; there were none valued at between 5,000*l.* to 10,000*l.*, but there were 2 valued at 10,000*l.* each.

The total amount of insurance to be covered in the Art Galleries was upwards of 220,000*l.*, of which sum the Lords Commissioners of the Admiralty contributed pictures, &c., to the value of 24,450*l.*, Earl Howe and the Marquis of Bristol 10,000*l.* each, whilst 45 others contributed exhibits valued at between 1,000*l.* and 7,000*l.*

There were 1,209 cases and registered parcels received, of which 625 were packing cases, and 584 parcels conveyed by carrier, post, or by hand.

There were 3,600 letters received, and 3,200 returned circulars, making in all close on 7,000 letters which passed through the post connected with the Art Section, whilst the number of those sent out was over 10,000, including letters and circulars sent.

The staff consisted of 4 clerks, 1 civilian and 3 non-commissioned officers of the R.M.L.I., and after the Exhibition was opened, of 6 attendants (pensioners of the R.N. and R.M.), whose duty it was to clean the galleries before 11 A.M., and to be in attendance throughout the day until 11 p.m.

Special fire precautions were taken to safeguard the property of exhibitors to the Art galleries, so organized that within the short space of 2 minutes and 31 seconds all the relics contained in 140 cases, and numbering over 1,700 different articles, could have been removed to a place of almost absolute safety.

A similar organization existed in connection with the pictures, but although we are unable to give any approximate time for clearing the galleries of pictures, owing to the impossibility of being able to put the same to a practical test (as in the case of the relics), we are in a position to state that the two most valuable pictures in the Exhibition, estimated at 20,000*l.*, would have been clear of the building in a little over three minutes, inclusive of the time taken to remove the relics. Water mains were fitted to each gallery, and firemen were in attendance day and night for the manning of the same, assisted by a select body of police.

The very utmost care that could be devised was taken to protect the pictures from damage owing to the structural conditions of the building and damp weather; and to such an extent was this carried out, that 1,116 hours were spent by professional cleaners in keeping

the pictures in order, a period of time equivalent to 139½ working days of 8 hours per diem for one man.

The Exhibition closed on the 24th October, and on the following Monday the work of returning the various exhibits commenced. The staff employed was 22 men, the working hours being from 8 A.M. to 4.30 P.M., Saturdays included, and in 32 days the whole of the art exhibits, with the exception of one letter, were returned safely to their respective owners.

Messrs. Bourlet were appointed to collect, hang, pack, and return the pictures, &c., and it is certainly due to their zealous care that no accident nor loss occurred.

The total approximate cost of receiving, hanging, cleaning, unhanging, delivering, and in several instances sending workmen to re-hang the pictures and replace sculpture, amounted approximately to 1,100*l.*, but this charge is exclusive of postage and of the general office expenses; whilst the cost of repairing damage done to pictures, their frames, or cases, amounted to only 47*l.*, a result so eminently satisfactory as to be almost beyond our most sanguine expectations, as well as beyond precedent, having in view the result of previous Exhibitions.

There is one subject, however, before closing, on which I would venture with every respect to touch. I do so because it is of almost Imperial importance, and is perhaps the most important question that arises out of the ashes of the now partially defunct Exhibition, and that is, that its memory should not be allowed to become dormant. How best then can we preserve it amongst us, and is this likely to be the case if we retain our pictures at Greenwich? Should not our great metropolis be their home, where, joining hand in hand with the relics of this Institution and the models of South Kensington, they might form the nucleus of a collection which would be almost immediately supplemented, if only for safety's sake, by the priceless paintings and relics which are now in the hands of private individuals, and which, from what we have seen and heard during the course of our existence, will never be sent to Greenwich as a last home?

This is a matter on which I will say no more; it is a subject for consideration; it is a point, as I have said, of Imperial importance, and one which is deserving of more than a passing remark.

Rear-Admiral H. F. CLEVELAND: Will you allow me, Sir, to start the hare? It would, I think, be a pity if these two interesting lectures were passed over with merely silent approbation. One reason for addressing you is that I have nothing whatever to say excepting one remark I would make with regard to an omission of my friend Sir Alfred Jephson, who, with that modesty so characteristic of him (you have only to look at his face to see it written there), has neglected to tell us what was the *cause* of this great success of the Naval Exhibition. Gentlemen, it was due to the tact, the constant attention, the amiability, and the business-like qualities of our Chairman, Vice-Chairman, and the staff by which they were surrounded, as well as to the general popularity of the Navy with the public. When I was first invited to take part in it I considered it a most risky business, and I certainly should never have been induced to associate myself with the Executive had I not been anxious to rally round my old chief Sir William Dowell. I think the end has justified the means, and I am very glad that the result has been to

form a nucleus of a fund which I hope will prevent the hat ever going round when any great catastrophe again overtakes us.

Rear-Admiral LONG: As I was in no way connected with the Naval Exhibition, I can perhaps give utterance better than some others here to what I am sure are the feelings of the whole Navy—that we are very much indebted to those Officers who have taken the trouble and have been at such great pains for so long a time to make this Exhibition a success. There is just one point one might remark on in the useful papers read, viz., the advocacy of a permanent Exhibition of Naval Pictures in London. I have recently been in Berlin, and also in Vienna, and I was particularly struck with the way in which in their arsenals they had hung up the pictures of all their great national battles and events. They evidently consider that it is part of the duty of the nation to keep these things alive in their memory, so that their young men as they grow up may have an opportunity of knowing what has gone before. I am afraid in my own Service a great many of us have been lamentably ignorant of what has gone before, not to say that we are so at this moment perhaps; and I must say, speaking for myself, I derived a great deal of information from the Exhibition, and I have taken the precaution to have the Catalogue bound, so that I may keep it for future reference. I think that the papers that have been read here will be very useful in that way, as they will go forth to the Service, and people who have not been able to see the Exhibition will, by means of this paper and by the Catalogue, be able no doubt to assimilate a great deal of information which otherwise it would have been very difficult to collect. I wish to tender my sincere thanks to Sir Alfred Jephson and Major Edye for the very useful papers they have read to us.

Admiral Sir VESEY HAMILTON, K.C.B.: I would like to make one remark following Admiral Long. He has always been a great advocate for the increase of our libraries, and I must say the only two books I ever derived any information from, barring the Regulations as supplied by the Admiralty, were two books well known to every person here, "Tom Cringle's Log" and "The Cruise of the Midge," which give useful accounts of the Coast of Africa and the West Indies. I must say that it is one of the grave faults of our Service that we are not supplied, as I believe foreigners are, with libraries under the Commanders-in-Chief, which may be of some use at the stations to which the ships go. I may as well confess that when I was at the Admiralty I did not do much to order it, and I think if we could form any Committee on Naval Libraries Admiral Long is the best man to put upon it. I am sure the lectures have been received by us all with great satisfaction, and if I were to say any more I should only trench upon the privileges of the Chairman.

Rear-Admiral COLOMB: I should like to add, with reference to the library, that since Admiral Sir Vesey Hamilton left the Admiralty, I understand the Treasury have been got round to the extent that they have agreed to the provision of the sort of library which is asked for, and I have no doubt, by-and-by, a little more may be got and we may have still better libraries. As I am on my legs—although one has not much to say when what is to be said has been said so admirably by both the lecturers—I cannot help expressing my appreciation of the wit and wisdom with which Sir Alfred Jephson's lecture was composed. It seemed to me to be exactly the sort of lecture which should be the finale of an Exhibition such as we have been celebrating: it seemed to have left out nothing that ought to have been said and to have said nothing that ought to have been left out. Then I think there is a feature about the Exhibition itself which ought to be dwelt upon as very peculiar. When we were getting into fairly working order at the meetings of the Executive Committee, one day I was sitting beside a gentlemen very well skilled in conducting exhibitions. He had been reproaching us for various shortcomings, and he turned round to me and said, "I cannot conceive anything worse managed than this! It is going to be a complete collapse." "Well," I said, "I think the reason of that opinion is, you really do not see what is going on." The lecturer has told us how we were divided up into a great number of small Committees. The Committees were working together synchronously; each of the little groups brought their work to a bigger group; that bigger group brought its work to the Finance Committee, and then it finally came to the Executive Committee; so that really

before we knew what we were about, the whole work was done. As the meetings went on, I felt more and more surprised at the extraordinary success of that method, but then you know, the real truth and strength of the matter was, we did not hear a cross word, we did not hear a sign of disagreement in any department from the very first to the last. I cannot say that there was a leading spirit anywhere, but there where the leading spirits in their proper places, going not beyond their proper places, and then we had the most perfect Chairman that I can possibly imagine to preside over us, and next to that we had the most perfect Secretary. You would all be of my opinion if you had only seen, as I have seen from time to time, Sir Alfred Jephson sitting at the table, smoking a cigarette, writing a letter, surrounded by people demanding this, that, and the other, and Sir Alfred settling everybody, smoothing all down, never losing his temper, doing exactly the proper thing that was to be done, finishing the cigarette and the letter, and the whole group melting away, everyone of them perfectly satisfied that he had got exactly what he wanted. Might I say one thing which I intended to have begun with, and I do not like finishing without saying it? What we want is the presence of Sir Geoffrey Hornby more often amongst us than it has been. I hope that he is going to turn over a new leaf and come here sometimes. He does not know how badly we want him, and he does not know how much we want the honour of Chairmen such as he is, attending our lectures.[1]

Admiral Sir WILLIAM DOWELL, K.C.B.: I suppose that I must say something, after the great compliment that has been paid me, but which, I assure you, I do not deserve, so much of the credit is due to the Vice-Chairman, Sir Houston Stewart, Sir Alfred Jephson, and the other Honorary Secretaries, also to the Chairmen of the Sub-Committees, and, indeed, everybody working with me, that my portion of the work has been very simple. I think it should be known how very much all of us naval men are indebted to what I may call the lay members of our Committees, gentlemen who are unconnected with the Service, but who have given us invaluable assistance. I allude to Sir George Chubb, Chairman of the Finance Committee; to Mr. Preece, the Electrical Engineer of the Post Office, Chairman of the Electric Lighting Committee; and to many others, amongst them Mr. Laird Clowes, Professor Laughton, and Captain Robinson (*the last two being naval men*), to whom we are indebted for the valuable historical information in the Catalogues; and Mr. Frank Baden-Powell, whom we have to thank for the diploma, which I am happy to say has given so much satisfaction. I also wish to mention the great services rendered to us by the gentlemen who undertook honorary duties, of Solicitors, Accountant, and Auditor of the Exhibition. The Solicitors, Sir Albert Rollit and Sons, have managed the whole of our law business, and, I believe, if we had had to pay for this, the bill would have amounted to four figures, the first not being a 1. They must have given, I think, something like 2,000*l.* or 3,000*l.* to our charity. The Accountant's work has been done by Mr. Langton, of the firm of Ogden, Palmer, and Langton. Considering Mr. Langton has been dealing with sums amounting to over 150,000*l.*, the work has not been light. The Auditor, Mr. Pennell, of the Admiralty, and who therefore may be said to be one of ourselves, has also had a very heavy task in going through entrances, tickets, &c., to ascertain any errors which may have occurred. The Trinity Board have also given us great assistance. The success of the Exhibition is attributable to the unanimity with which all have worked together during the eighteen months we have been engaged. Of course we have had many differences of opinion, but all difficulties have been

[1] Not intending to speak, and so being unprepared, I omitted to make a remark which I certainly should not have omitted had I considered. It should be placed on record that the work of Rear-Admiral Bowden-Smith, as Chairman of the "Entertainments" Committee, was very different and much more arduous than that of any other Chairman of Committee. To my certain knowledge he was Chairman, Secretary, and Manager to the whole of that Department when it was initiated; and without doubt that most successful and important part of the Exhibition could not have been what it was, but for the untiring devotion and skill of Rear-Admiral Bowden-Smith.

smoothed over, and no ill feeling has ever existed. I feel personally indebted to my colleagues for the pleasant relations which have existed between us.

Captain CURTIS: It appears from what the Admiral has said that he was in this happy position, that he left all the work to his Officers, and had very little to do. That is his modesty, I presume. But any man who remembers the Navy for fifty years must be very thankful when the naval uniform came into vogue. I have been Midshipman and Lieutenant of division for many years, and most difficult it was in the early part to get the men into uniform—generally a year or eighteen months before we could get them into uniform—and there was a great deal of punishment on board ships in consequence. At "Comox," Vancouver, N.P., in 1890, it was a real treat to see the men come ashore. The men came ashore and behaved just as well as they did at the Exhibition. There were two saloons, but I never saw a man drunk, and there were a good many inducements by way of the men being treated. I am sure the public at large have received great benefit from what they have seen in the Exhibition.[1]

Sir ALFRED JEPHSON: I should like to say one word with regard to the very complimentary way in which Admiral Colomb has spoken of my services, that is, just to remind you that any little thing I have been able to do has been entirely owing to the consideration shown by all the members of the Committee towards me, and also to the great assistance I received from Lieutenant Maltby and all the Assistant Honorary Secretaries. They all pulled together as one man, and if I might supplement Sir William Dowell's speech, it was not only the Trinity that helped us, but it was the unity.

The CHAIRMAN (Sir Geoffrey Hornby): Having passed fifty-five years in the Service, I may perhaps be allowed one or two words. I wish to say it seems, or it ought to seem, to a great many of you a very curious thing that after a number of naval Officers have brought to a most satisfactory conclusion a very important work, and one in which the whole country, to say nothing of this assembly, is largely interested, yet none of them are to have the smallest credit for what they have done. Well, then, there is only one thing we must fall back upon, and that is that

"There's a sweet little cherub that sits up aloft,"

and that he is particularly looking after "the life of poor Jack." There was another cherub with whom I once had the honour of being associated at the Admiralty. I was engaged on a Committee on which Mr. Bidder, the great engineer and calculating boy, was also sitting, and his opinion, after a long intercourse with us, was that "you naval fellows are the most illogical chaps that ever was in this world." I have pondered over that since, and I have been thinking how it is that these illogical men, these incompetent men as we are all said to be, have somehow or other managed to work the thing out, and that, go where you will or send the Navy where you will, they always pull through. I am sorry to say I have had in my time to send Officers to do a piece of work, and I have felt at the same time, "This is a very unfair business. I have to send this Officer to get right a thing I cannot see either the origin or the outcome of, and all I can say to him is he is to do his best in the interests of the country." I am bound to say I have had to send away many on some such errands, and never have I known of a failure. All I can say is I think we learn in the Service a quality which I can only describe as "adaptability;" that we can suit ourselves to circumstances; that the elements with which we are brought in contact when we are young teach us that we have to deal with circumstances of great importance at a moment's notice, and it excites the faculty very favourably indeed. Now it has been simply carrying out those rules, which you may say begin in the Midshipman's berth and gradually develop in the Navy, that has enabled this Exhibition to have been brought to such a very satisfactory conclusion. I only hope one thing in Sir Alfred Jephson's lecture will be laid to heart here and spread as much as it can be through

[1] I consider the men's general behaviour, language, and conduct a pleasing contrast to that of many of the inhabitants; and no doubt it has had a good effect, as I heard many remarks as to their good conduct.

the country generally, and that is the wish there expressed that this Exhibition should lead all people to see the great necessity there is for keeping the Navy, if it can, efficient for war. To my mind the most striking feature in the Exhibition was that wonderful display of mercantile wealth exhibited in the models, and the thought I could wish to have been brought home more clearly to the visitors than any other was, how it is that all that wealth is to be cared for if we should unfortunately be plunged into war. It is one of those topics which everybody in England ought to lay to heart, and to try to improve, and to bring home to the people. The question is a very serious one how seamen are to be educated, since we have done away with compulsory apprenticeship, and how they are to be dealt with to protect all that enormous marine. I am very glad indeed to think that the men of the Navy have been seen here in London, and seen in a way that shows how good the education of the seamen is in the Royal Navy. Nothing can be better, in my humble opinion. If the mercantile marine of the country is to be defended as it ought to be, we have simply to do what we see, and what we are supposed to think is a heavy burden, laid upon foreign nations, that is, to see that the Navy shall devote itself to bringing up a class of seamen, and not only seamen, but men who are accustomed to discipline and to the discharge of duty, so that if war comes on, all these men may be ready to rejoin their old Service, and carry the country through the war as the country has been carried through war before. If we do not, it is impossible that the sea can be commanded as our forefathers commanded it.

Sir WILLIAM DOWELL: Before we part I should like to propose a vote of thanks to Sir Geoffrey Hornby for having been so good as to come up to-day and give us his assistance. As Admiral Colomb said, we wish we could oftener see him here, but as he so seldom comes, I think we are the more indebted to him for having come on this occasion.

Sir VESEY HAMILTON: I beg to second that. I am sure not only all present, but everybody who will read the statesmanlike speech made by Sir Geoffrey Hornby, will profit by it. [The resolution was carried by acclamation.]

The CHAIRMAN: I am very much obliged for the kind way in which reference has been made to me. There is one other matter of duty which I have to ask you to authorize me to perform, and that is one that I am sure will be very agreeable to you, viz., to return to the lecturers your best thanks for the very able discourses which they have given to us, affording, as they have done, a great amount of instruction. The Naval Exhibition is largely indebted to them; they have wound it up in the most complete manner by the exposition they have given of what was done.

Sir ALFRED JEPHSON: I wish to thank you for the vote of thanks you have given us, and also to express the great satisfaction I feel that you, Sir, as my old Chief, have presided on this occasion.

NAMES OF MEMBERS who joined the Institution between the 1st January and the 31st March, 1892.

LIFE MEMBERS.

Russell, W., Capt. R.E.
McLeod, D. J. S., D.S.O., Lt.-Col. Ind. Army.
Rycroft, W. H., Capt. 7th Drag. Gds.
Bell, James A., Staff Paymr. R.N.
Harrison, W., Major 3rd Bn. L.N. Lan. Regt.
St. John, O. B., Capt. late 58th Regt.
Kershaw, F., Capt. 2nd Bn. York and Lanc. Regt.
Grubb, A. H. W., Lieut. R.E.
Lambton, Hon. W., Lieut. Colds. Gds.
Bevington, S. N., Lieut. The Queen's (Rl. W. Surrey Regt.).
Sackville-West, C. J., Lieut. King's R. Rifle Corps.
Drummond, K. M., Capt. Leinst. Regt.
May, William B., Lieut. R.N.

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Hobart, C. V. S., Lieut. Gren. Gds.
Alexander, A. H., Major Brit. Guiana Vol. Militia.
Egerton, C. P., Lieut.-Col. Dorset Regt.
Briggs, W. E., Major Hamp. Regt.
Guinness, E., Capt. R.A.
Hore-Ruthven, Hon. W. P., Lieut. Sco. Gds.
Murray, J. W., Major R.A.
Manifold, J. F., Capt. R.A.
Smyth, R. N., Lieut. 21st Hussars.
Drake, W. H., Capt. 7th Bn. Rifle Bde.
Battiscombe, C., Lieut. R.A.
O'Donnell, H., Capt. W. Yorks Regt.
Logan, F. C. L., Lieut. L.N. Lan. Regt.
Lamb, C. A., Capt. Rifle Bde.
Crowe, E. A., Lieut. 1st V.B. R. Fus.
Cooper, C. Abercrombie, Lieut.-Col. late Pemb. Arty. (W. Div. R.A.).
MacMunn, G. F., Lieut. R.A.
Mackworth, Sir A. W., Bart., Col. R.E.
Robb, David, Ch. Engr., Inspector of Machinery (retd.) R.N.
Jones, T., Lieut. R.A.
Campbell, J. C., Capt. R.E.
Chancellor, J. R., Lieut. R.E.
Wardrop, J. C., Lieut. Fife Lt. Horse Vols.
Brunner, F. W., Lieut. R.E.
Cherry, H. A., Major Northd. Fus.
Ducrôt, L. H., Capt. R.A.
Maguire, T. M., Lieut. 14th Middx. Rifle Vols.
Farrant, R. K., Lieut. R.A.
Tyrrell, G. E., Lieut. R.A.
May, W. S. R., Lieut. 1st Bn. E. Yorks Regt.
Loch, H. F., Capt. Ind. S. Corps.
Everett, Allan F., Lieut. R.N.
Vickers, C., Lieut. R.W. Sur. Regt.
Shewell, H. W. M., Capt. R.A.
Awdry, H., Lieut. 1st V.B. R. Bucks Regt.

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,
Colonel R.E. ret.

THE DEFENSIVE STRENGTH OF RUSSIA.[1]

Compiled by Major MAURICE RECH, Imperial and Royal Austro-Hungarian Army. Translated by Major C. E. DE LA POER BERESFORD, Wilts Regiment.

General Officers on Service at St. Petersburgh.

War Minister: General (of infantry) Wannovski.
Adlatus and Private Secretary: General (of infantry) Durnovo.
Chief of the General Staff: General (of infantry) Obrutsheff.
Adlatus: Lieutenant-General Welitschko.
Inspector-General of the Artillery: H.I.H. Grand Duke Michael (Field Marshal).
Inspector-General of the Cossacks (Ataman): H.I.H. Grand Duke Nicholas Alexandrovitch (Czarewitch).
Director of Technical Administration: Major-General Saboltkin.
Inspector-General of Rifle Battalions: General (of infantry) von Nothbeck.
Inspector-General of Cavalry: H.I.H. Grand Duke Michael (Field Marshal).

Governors-General of the most important Governments.

Warsaw: General (of cavalry) von Gourko, also Commander-in-Chief of the Troops, and, in case of war, Presumptive Chief of the Forces in Russian Poland.
Moscow: H.I.H. Major-General Grand Duke Sergius.
Kieff: General (of infantry) Ignatieff.
Caucasus: General (of cavalry) Scheremetieff, also Commander-in-Chief of the Troops.

Military District Commanders (the most important).

St. Petersburgh: H.I.H. Lieutenant-General Grand Duke Vladimir.
Warsaw: General (of cavalry) von Gourko.
Wilna: General (of infantry) Panetski II.
Kieff: General (of infantry) von Dragomiroff.
Moscow: General (of artillery) Kostanda.

[1] From the "Militär Zeitung," February 21, 1892.

Army Corps Commanders.

Guard Corps	St. Petersburgh: Gen. (cav.) von Manse.
Grenadier Corps	Moscow: Lieut.-Gen. Malachòff.
1st Army Corps	St. Petersburgh: Lieut.-Gen. Danilòff.
2nd „ „	Wilna: Gen. (cav.) Baron Driesen.
3rd „ „	Riga: Gen. (inf.) Alchasòff.
4th „ „	Minsk: Gen. (inf.) Petruschèvski.
5th „ „	Warsaw: Gen. (art.) Sviestunòff.
6th „ „	Warsaw: Gen. (inf.) Kulgatschèff.
7th „ „	Sevastopol: Lieut.-Gen. Janòvski,
8th „ „	Odessa: Gen. (of engineers) Röhrberg.
9th „ „	Kieff: Lieut.-Gen. Òvander.
10th „ „	Charkoff: Lieut.-Gen. Winberg.
11th „ „	Zitomir: Lieut.-Gen. Prince Schachòvskoje.
12th „ „	Uman: Lieut.-Gen. Sverjeff.
13th „ „	Moscow: Lieut.-Gen. Igelström.
14th „ „	Lublin: Lieut.-Gen. Krschivòblotski.
15th „ „	Warsaw: Lieut.-Gen. Mirkovitsch.
16th „ „	Vitebsk: Lieut.-Gen. Richter.
17th „ „	N. Novgorod: Lieut.-Gen. Saljesoff.
Caucasus Army Corps	Tiflis: Lieut.-Gen. Count Tschavtschavadse.
Finland	Commander-in-Chief, Gen. (inf.) Count Heyden. Chief of the Staff, Maj.-Gen. Kaulbars.

Inspectors-General of Fortresses.

Group I: Lieutenant-General Anossoff; including the fortresses Bobruisk, Brest-Litovski, Dünaburg, Dünamünde, Gonionds, Ivangorod, Kars, Kertsch, and Petshersk in Kieff.

Group II: Lieutenant-General Pavloff; including the fortresses Korno, Kronstadt, Michaelòvo, Novo-Georgievsk, Odessa, Ossowez, Otschakov, Poti, St. Petersburgh (St. Peter and St. Paul Fort), Sevastopol, Sveaborg, Wyborg.

Group III: Major-General Stepanoff. The fortified places Achalzich, Alexandropol, Ardahan, Batoum, Bender.

DISTRIBUTION OF TROOPS.

Ist Military District, St. Petersburgh.

Commander, H.I.H. Grand Duke Vladimir, &c.

Guard Corps, consisting of—

1st Guard Cavalry Division (2 Guard Don Cossack regiments, 1 Ural Cossack sotnia, 4 Guard Cuirassier regiments), together 25 squadrons, of which 9 now in Warsaw.

2nd Guard Cavalry Division (7 regiments in 3 brigades), 42 squadrons.

Guard Rifle Brigade.
1st and 2nd Guard Infantry Divisions.
1st and 2nd Guard Artillery Brigades.

All the above, with the exception of 9 squadrons in Warsaw, in St. Petersburgh.

1st Army Corps, St. Petersburgh District :—
1 cavalry division at Twer. 4 sotnias of Kuban and Terek Cossacks, of which 2 sotnias at Gatschina as escort to the Emperor.
37th Infantry Division and the Guard Horse Artillery Brigade (St. Petersburgh). 22nd Infantry Division, 22nd and 37th Artillery Brigades and 1st Reserve Artillery Brigade (Novgorod). 23rd Infantry Division and 23rd Artillery Brigade at Reval and Gatschina. 1st Sapper (Engineer) Brigade, and 11 infantry reserve battalions, St. Petersburgh: together numbering

95 battalions,
62 squadrons,
6 horse artillery batteries,
36 field artillery batteries.

IInd Military District, Finland.

Commander, General Adjutant and Infantry General Count Heyden, &c.

19th Don Cossack Regiment, Abo.
24th Infantry Division
24th Artillery Brigade
4 cadre infantry battalions } Helsingfors.
9 rifle battalions: together numbering

29 battalions,
6 squadrons,
6 batteries.

IIIrd Military District, Wilna.

Commander, General (of infantry) von Ganetzki.

2nd Army Corps, Wilna: consisting of the 2nd Cavalry Division (Suwalki) *at present in Wilna; 26th* Infantry Division and 26th Artillery Brigade (Grodno); 27th Infantry Division and 27th Artillery Brigade (Wilna). 28th Infantry Division (Dünaburg) belongs now to the 3rd Army Corps (Riga). 28th Artillery Brigade (Witebsk) belongs now to the 3rd Army Corps (Riga).

3rd Army Corps (Riga): consisting of the 3rd Cavalry Division and 25th Infantry Division (Kovno), belongs now to the newly-formed 16th Army Corps. *29th Infantry Division and 29th Artillery* Brigade in Riga. 25th Artillery Brigade in Wilkomir, belongs now to the newly-formed 16th Army Corps.

4th Army Corps (Minsk): consisting of the 4th Cavalry Division in Bijalistock, 5th Rifle Brigade (Wilna), transferred to Suwalki. 30th, 41st (belongs now to the 16th Army Corps), and 47th Reserve Infantry Divisions, 30th and 41st (now in 16th Army Corps) Artillery Brigade (Minsk). 16th Infantry Division (Mogileff), transferred to Bijalistock and Wolkovski. 45th Reserve Infantry Division (Dünaburg). 46th Reserve Infantry Division (Wilna). 16th Artillery Brigade (Gomely), transferred to Bijalistock and Wolkovski. 2nd Engineers and Railway Brigade (Riga), transferred to Wilna.

16th Army Corps (Witebsk): consisting of 25th Infantry Division and 25th Artillery Brigade (Dünaburg). 41st Infantry Division (Mogileff). 41st Artillery Brigade (Gomel).

This is a newly-formed Army Corps.

Strength of the whole military district, Wilna, in 1891:—

70 squadrons,
156 battalions,
56 batteries.

IVth Military District, Warsaw.

Commander: General (of cavalry) von Gourko.

3rd Guard, Cavalry Brigade, Warsaw.
3rd Guard, Infantry Division, Warsaw.
3rd Guard, Artillery Brigade, Warsaw.

5th Army Corps (Warsaw): consisting of the 5th Cavalry Division (in Wloclavsk), 7th Infantry Division, 7th Artillery Brigade (Radom), 10th Infantry Division (Warsaw), 10th Artillery Brigade (Lodicz).

6th Army Corps (Warsaw): consists of the Kuban Cossack Division of Warsaw. 6th Cavalry Division, 4th Infantry Division (Lomza). 6th Infantry Division (Plock). 8th Infantry Division, Warsaw (belongs since 1889 to the 15th Army Corps). 4th Artillery Brigade (Ostrog). 6th Artillery Division (Pultusk), transferred to Warsaw in 1889. 8th Artillery Brigade (Lodz), transferred to the 15th Army Corps in 1889.

14th Army Corps (Lublin): consisting of the 14th Cavalry Division (Censtochau), transferred to Kielze in 1889. Don Cossack Cavalry Division (Zamosk), belongs to 15th Army Corps since 1889. 1st Rifle Brigade at Wloclavsk. 2nd Rifle Brigade (Censtochau). 17th Infantry Division (Siedlec), transferred to Lublin and Wlodova in 1889. 18th Infantry Division (Lublin). 17th Artillery Brigade (Bjela), transferred to Lublin and Wlodova. 18th Artillery Brigade (Lublin). 4th Engineer Brigade (Warsaw). 16 reserve infantry cadre battalions, which in case of war would form

The 48th Infantry Division at Warsaw,
49th ,, ,, Novo-Georgievsk,
50th ,, ,, Lublin, and
51st ,, ,, Brest-Litovski.

15th Army Corps, Warsaw: lately formed from parts of the old 15th Corps (Kazan district) and the 6th Corps, consisting of—

The Don Cossack Division, Samostje.
13th Army Cavalry Division, Lublin.
2nd Infantry Troop Division, Brest-Litovski.
2nd Artillery Brigade, Bjela.
8th Infantry Troop Division, Warsaw.
8th Artillery Brigade, Lowitsch.

Grand total of the IVth Warsaw Military District; including the changes above noted, which constitute a reinforcement, since 1888, of 30 battalions, 278 squadrons, and 5 batteries:—

176 battalions.
6 technical battalions.
134 squadrons.
60 batteries.

Vth Military District, Kieff.

Commander: General-Adjutant and General (of infantry) Radetzki.

9th Army Corps, Kieff. This corps has been lately formed from parts of the 9th Corps (Orel) and the 12th Corps, and moved to Kieff; it now consists of—

The 9th Army Cavalry Division, Romni.
5th Army Infantry Division, Tschernigoff.
5th Army Artillery Brigade, Nieschin.
33rd Army Infantry Division, Kieff.
33rd Army Artillery Brigade, Kieff.
3rd Engineer Brigade, Kieff.
4 reserve battalions (forming 55th Reserve Division), Kursk.

10th Army Corps, Kharkoff. This corps has been lately formed from the old 10th Corps, and transferred to the Kieff Military District; it consists of—

The 10th Army Cavalry Division, Kharkoff.
9th Army Infantry Division, Poltawa.
9th Army Artillery Brigade, Poltawa.
31st Infantry Division, Kharkoff.
31st Artillery Brigade, Bielgorod.
4 reserve battalions to form 54th Reserve Division.

11th Army Corps, Zitomir, consisting of—

The 11th Cavalry Division, Dobno.
11th Infantry Division, Luck.
32nd Infantry Division, Zitomir.
11th Artillery Brigade, Rovno.
32nd Artillery Brigade, Berditscheff.

12th Army Corps, Kieff, consists of—

The 12th Cavalry Division, Staff in Kieff, now in Winniza; the 4 regiments of this Cavalry Division were moved so far back as 1888 to the Austrian frontier, between Troskuroff and Kameniec-Podolsk.
The 3rd Rifle Brigade, Tulcin.
12th Infantry Division, Miczibuzie.
19th Infantry Division, Uman.
8 reserve infantry cadre battalions, to form in war-time, the 52nd Infantry Division at Kieff, and the 53rd Infantry Division at Winniza.
The 12th Artillery Brigade, Winniza.
19th Artillery Brigade, Smiela.
3rd Engineer Brigade, Kieff.

Thus, the grand total of the Kieff Military District, which in 1888 was 76 battalions, 48 squadrons, and 4 horse and 24 field batteries, is now, 1891–92,

156 battalions,
70 squadrons,
63 batteries;

or has been nearly doubled.

VIth Military District, Odessa.

7th Army Corps, Sevastopol, consists of—

The 7th Cavalry Division, Elizabethgrad.
13th Infantry Division, Sinferopol.
34th Infantry Division, Ekaterinoslav.
13th Artillery Brigade, Sevastopol.
34th Artillery Brigade, Kherson.

8th Army Corps, Odessa, formed of—

The 8th Cavalry Division, Kischeneff.
4th Rifle Brigade, Taganrog.
14th Infantry Division, Kischeneff.
15th „ „ Odessa.

Twelve infantry reserve cadre battalions, forming, in case of war four reserve divisions:—

The 50th Infantry Division, Odessa.
61st „ „ Nicholaieff.
62nd „ „ Sevastopol.
14th Artillery Brigade, Kischeneff.
15th „ „ Wosnosensk.
5th Reserve Artillery Brigade, Taganrog.
5th Engineer Brigade, Odessa.

Grand total Military District, Odessa—

86 battalions.
48 squadrons.
4 H.A. batteries.
30 field batteries.

VIIth Military District, Kharkoff.

Broken up in 1889, and partially incorporated in the Vth, or Kieff, Military District.

9th Army Corps, Orel, consisted of—

The 9th Cavalry Division, Romni.
5th Infantry Division, Cernizoff.
36th „ „ Orel.
5th Artillery Brigade, Nieschin.
36th „ „ Mcensk.

10th Army Corps, Kharkoff, consisted of—

The 10th Cavalry Division, Kugnieff.
9th Infantry Division, Poltawa.
31st „ „ Kharkoff.
9th Artillery Brigade, Poltawa.
31st „ „ Bielgorod.
4th Reserve Artillery Brigade, Kursk.

Twelve infantry and reserve cadre battalions, forming, in case of war, the 57th, 58th, 59th Infantry Divisions, Charkoff, Kursk, Orel, respectively.

Grand total since the transfers and reduction of 1888:—

76 battalions.
48 squadrons.
4 H.A. batteries.
30 field batteries.

N.B.—Thus it will be seen that the increase in the Vth Military District, Kieff, has been chiefly carried out at the expense of the VIIth Military District, Kharkoff.—[TRANSLATOR.]

VIIIth Military District, Moscow.

Commander H.I.H. Grand Duke Sergius, &c.

Grenadier Corps at Moscow, consists of—

The 1st Grenadier Division, Moscow.
2nd „ „ Kaluga, now in Moscow.
3rd „ „ Tambov, now in Moscow.

1st Artillery Brigade, Moscow.
2nd „ „ Kaluga.
3rd „ „ Rijazan.
1st Cavalry Division, Moscow.

13th Army Corps, Moscow, consisting of—

The 13th Cavalry Division, Rijazan, now in Lublin with 15th Corps.
1st Infantry Division, Moscow.
3rd „ „ N. Novgorod, sent to 17th Corps.
35th „ „ Jaroslav, sent to 17th Corps.
1st Artillery Brigade, Moscow, now at Wiasma.
3rd „ „ Paulovski, sent to 17th Corps.
35th „ „ Rostov, sent to 17th Corps.
3rd Reserve Artillery Brigade, Smolensk.
2nd „ „ „ Serpuchoff.

Twenty infantry reserve cadre battalions, forming, in case of war, the following reserve divisions, viz. :—
56th Division, Moscow; 57th Division, Vladimir; and the 58th Division, Orel.
17th Army Corps, Nishni-Novgorod, newly formed, commanded by Lieutenant-General Saljesoff, consists of—

The 3rd Infantry Division, N. Novgorod.
35th „ „ Jaroslav.
3rd Artillery Brigade, Paulovsk.
35th „ „ Rostoff.

Four reserve cadre battalions, forming, in war time, the 59th Reserve Division, Jaroslav.
N.B.—This army corps is nearly entirely formed of transfers from the 13th Moscow Army Corps.
Grand total VIIIth Military District, Moscow, in 1891 :—

132 battalions.
24 squadrons.
56 batteries.

IXth Military District, Kazan.

Commander, General-Adjutant, and General (of infantry) Meschtschèrinoff.

15th Army Corps, Kazan, formed in 1888, but now mostly transferred to the IVth Military District, Warsaw, consists of—

The Astrakhan Cossack Cavalry Regiment, Kazan, now in Astrakhan.
Sixteen sotnias Orenburg Cossacks with two horse artillery Cossack batteries, Orenburg.

63rd Infantry Division, Kazan.
64th „ „ Penza.
65th „ „ Ssamara, besides the six local battalions at Kazan and Orenburg.

Grand total IXth Military District, Kazan :—

50 battalions.
20 Cossack sotnias.
2 horse artillery batteries.
12 field „ „

Xth Military District, Province of the Don.

Ataman, Lieutenant-General Prince Swiàtopolsk-Mirski.

The 12th Don Cossack Cavalry Regiment at and about Novo-Cerkask, which is at present the seat of the Don Cossack administration.

XIth Military District, Caucasus.

Commander: General-Adjutant and General (of cavalry) Dondokòff-Korsakoff.

1st Caucasian Army Corps, Tiflis, consists of—

The 1st Caucasus Cossack Cavalry Division, Tiflis.
2nd „ „ „ „ Elisabethpol.
Caucasus Grenadier Divisions, Tiflis.
38th Infantry Division, Achalzich, now in Kutais.
39th „ „ Alexandropol.
Caucasus Grenadier Artillery Brigade, Tiflis.
38th Artillery Brigade, Achalzich.
39th „ „ Kars.

2nd Caucasian Army Corps, Tiflis, consists of—

The 3rd Caucasian Cavalry Division, Helenendorf, now in Tiflis.
Kuban Cossack Cavalry Brigade, Ekaterinodat.
Terek „ „ „ Vladikavkas.
Caucasus Rifle Brigade, Tiflis.
19th Infantry Division, Stàvropol, transferred to 12th Corps, Uman.
20th „ „ Vladikavkas.
21st „ „ Petrovsk, now in Temir-Khan.
19th Artillery Brigade, Stàvropol, transferred to the 12th Corps, Uman and Smiela.
20th „ „ Vladikavkas.
21st „ „ Temir-han-Schura.

2nd Infantry Division, Kazan.
40th „ „ Ssaratoff.
Twelve infantry reserve cadre battalions to form, in case of war, the—

Kuban Artillery Brigade, Ekaterinodat.
Caucasus Engineer Brigade, Tiflis.
2 Cossack rifle battalions and 18 reserve battalions.

Grand total of the XIth Military District, Caucasus :—
Grand total, 1888 :—

120 battalions,
102 squadrons,
6 H.A. } batteries,
40 field }

and in 1891, after the reinforcement of the Vth Military District, Kieff, from the Caucasus :

100 battalions,
90 squadrons,
42 batteries.

Fortress Artillery for the whole Empire.

This force especially told off for the attack and defence o fortresses is thus distributed divided into battalions :

6	battalions	in Kronstadt.
6	„	„ Modlin.
2	„	„ Sveaborg.
2	„	„ Wyborg.
1	„	„ Dünamünde.
4	„	„ Dünaburg (siege train).
4	„	„ Brest-Litovski (siege train).
4	„	„ Ivangorod (siege train).
3	„	„ Kieff.
2	„	„ Ostchakoff.
1	„	„ Bobruisk.
3	„	„ Warsaw.
1	„	„ Bender.
3	„	„ Kertsch.
1	„	„ Kars.
1	„	„ Batoum.
1	„	„ Alexandropol.
1	„	„ Daghestan.
1	„	„ Poti.
1	„	„ Michaelovsk.

Total 48 battalions.

XIIth Military District, Turkestan.

Its establishment consists of—

46 Cossack Cavalry Sotnias: of these, however, 18 squadrons were sent to Europe in 1889, so there remain—

28 Sotnias Cossack Cavalry.
3 Brigades of Rifles, at Askabad and Merv.
20 Line Battalions, for Tashkend, Samarkand, and Kerki.
3 Local Battalions.
½ Engineer Battalion.
2 Railway Battalions, Tashkend, now at Kezil-Arvat and Samarkand.
2 Horse Artillery } Batteries.
1 Mountain }
1 Turkestan Artillery Brigade.

Grand total:

32 battalions (the establishment being 34½).
28 (of an establishment of 46) sotnias.
3 H.A. batteries.
10 field batteries.

N.B. From this district 18 squadrons and 2½ battalions have been directed westwards.—[TRANSLATOR.]

SIBERIA.

XIIIth Military District, West Siberia.

16 Cossack Sotnias of Cavalry in Dscharkend and Wierni.
8 Line Battalions.
3 Local Battalions.
1 Company Engineers.
1 Mountain Mounted Battery.
1 West Siberian Artillery Brigade.

Total:

11¼ battalions.
16 sotnias of cavalry.
4 field } batteries.
1 mountain }

XIVth and XVth. Military Districts, Irkutsk and Amur.

9 Cossack sotnias of cavalry.
2 Brigades of Rifles (transferred to Europe in 1889).
2 Cossack infantry battalions.
6 infantry battalions.
2 sotnias Amur infantry.

6 infantry reserve cadre battalions.
1 East Siberian Artillery Brigade of 4 batteries.
2 Cossack H.A. batteries.
1 Company Engineers.

Total 12 battalions (the Rifles deducted).
9 sotnias, cavalry.
6 batteries.

Summary.—The whole length of the German and Austrian frontiers, from Libau to Kameniec-Podolsk, is watched by a continuous chain of Russian Cavalry Corps, belonging to the centres—Warsaw, Wilna, Kieff, which shelter Moscow and Odessa. Thus the enormous force of seventeen Russian Army Corps is grouped in a space more than twice as large as our whole Fatherland (Austria-Hungary).

There are now in the Military District of Wilna *four* Army Corps, as against *three* in the spring of 1888. In the Warsaw District, a portion of the Guard Corps, and behind this, four more Army Corps; so that the available force in this district is stronger by:

24 battalions,
27 squadrons, and
4 batteries,

than it was in 1888.

The reinforcement of the Vth Military District, Kieff, is most striking: until 1888 there were only 2 corps in it; now the VIIth Military District, Kharkoff, is incorporated with it, and 20 battalions and 12 squadrons have been transferred to it from the Caucasus; so that now the Kieff District comprises 4 Army Corps, which constitutes a reinforcement here alone of:

80 battalions,
22 squadrons, and
35 batteries.

The Military District of Moscow receives a new corps, and now numbers 24 battalions and 4 batteries more than in 1888; whilst 24 squadrons have been sent from it westwards.

From these statements it can be understood that the tendency of the Russian War Ministry since 1888 has been to bring successive bodies of troops from the eastern provinces, so as to strengthen very considerably the military districts which lie near the German and Austrian frontiers.

THE NAVAL SCHOOLS OF THE CHIEF CONTINENTAL POWERS. PART IV.

(*Continued from No.* 170.)

Compiled by Major W. TENISON, the Manchester Regiment, from papers in the "Rivista Marittima," by 1st Class Commissary DANTE PARENTI.

Spain (*continued*).

The routine of the School is as follows:—

5.30 to 6	Réveille.
6 to 7.30	Studies.
7.30 to 8	Preparation for inspection.
8 to 8.15	Inspection.
8.15 to 10....	Lectures.
10	Lunch.
11 to 12.30....	Lectures.
12.30 to 2	Studies.
2 to 4	Lectures and exercises.
4 to 7	According to station, recreation and dinner.
7 to 9.15	Studies.
9.15	Slinging hammocks.
9.30	Lights out.

A month previous to the examinations, extra voluntary study is permitted for an hour or two after lights out.

On Feast days, studies last only for an hour in the morning and two hours in the evening. On these days the students may receive visits from their parents within the limits established by the Commandant. In case of illness, the Commandant may authorize the visits of parents on any day of the week. On Sundays and holy days the students are allowed to land and visit their parents. They are accompanied by an Officer to a certain spot, where they must reassemble before returning on board ship. Those students who have a father or mother, or some friend duly recognized by their family, living in the town, may, on the first Sunday in each month, obtain leave for the whole day. This privilege is also conceded, so far only as father or mother is concerned, to deserving students on holy days.

Board of Administration.—This is composed of

The Director as President.
The Sub-Director.
One Professor.
Three Professors selected by the Director.
One Professor (junior) as Secretary.

Its duties are :—

(*a.*) To keep the studies up to the standard of the most modern changes and progress in those sciences and arts relating especially to naval organization.

(*b.*) To submit any change in the programme of examination which may be deemed expedient.

(*c.*) To make a report, and give an opinion, on all scientific conferences which take place at the School.

(*d.*) To determine the limits of instruction, both theoretical and practical, to be given in the classes.

(*e.*) To select the works, the instruments, the models, &c., to be acquired for the instruction of the students, for the library, and for the chemical, physical, and meteorological laboratories.

The Board assembles at the discretion of the President.

All questions are decided by majority of votes, but any individual member may have his opinion recorded.

The Studies.—The whole course is divided into five courses of six months each, commencing on the 1st of January and 1st of July in each year. The subjects of instruction are arranged on a progressive scale, culminating in the class for Navigation and Hydrography, Artillery, Nautical Meteorology, Manœuvring, and Fencing.

Those students, who by reason of a special examination are permitted to join the second or third course immediately on admission, must, at the disposition of the Commandant, be instructed during extra hours, and without prejudice to their other studies, in those military and naval exercises which are taught in the 1st class.

The students are exercised in naval telegraphy and the practical management of engines, and those in the last course are transferred to cruisers placed at the disposal of the School.

Half-yearly Examinations.—These take place at the end of each half-year, and are conducted by a Board composed of the Director, Sub-Director, Third in Command, and all the Professors. This Board can be subdivided into two when the number of students exceeds fifty, and into three when it exceeds ninety.

Previously to the half-yearly examination, each Professor classifies the students in two lists according to their proficiency, and forwards these lists to the Director. The results of the examinations in Mechanics, Physics, Astronomy, Navigation, Engines, and Artillery are determined by marks as follows:—

3, unsatisfactory; 4—6, satisfactory; 7—9, good; 10—12, very good; 13, excellent.

The members of the Board record their votes twice; the first time as to the fitness, or otherwise, of the candidate (these are kept secret); the second time as to the order of merit of the candidate. This is expressed in marks. Each member of the Board, commencing with the junior, records his opinion by marks as above, thirteen being the maximum. In practical studies, such as Gymnastics, Fencing, and Naval and Military exercises, the marks are good, very good, or satisfactory.

Any student failing in the half-yearly examination may repeat the

six months' course, but if he fails a second time is liable to dismissal from the School. All students, who have not obtained the mark "satisfactory" in practical studies, are punished by being placed under arrest till the commencement of the next course. Those who fail at the final examination undergo thirty days' arrest, beginning on the first day of embarkation.

A candidate, who is unable to go through the examination at the same time as the others on account of illness, may do so as soon as well enough. If a student is absent for thirty days from lectures in any one subject through illness, he may be excused from examination in it, provided he presents himself for examination within the first fifteen days of the succeeding course. If for sixty days, he may be excused from examination, and repeat the course; in case of failure, however, to pass at the end of the repeated course, it will not prevent him from repeating the course once more.

The students after passing successfully the examination at the end of the last course obtain forty days' leave. Leave is also granted to all who have passed the half-yearly examinations for the time between the end of one and the beginning of the next course.

Prizes and Penalties.—Application and progress in study, apart from receiving its own reward in the consideration of the authorities and in seniority, is rewarded at the end of the course by a silver medal with blue ribbon, inscribed on one side "Prize for application," and on the other "Naval School." To this medal, which may be won at every half-yearly examination, and therefore worn during the entire sojourn at the School, is added a bar bearing the names of the subjects in which the recipient may have obtained full marks.

Punishments awarded are of two classes: light or severe. The first are awarded for slight irregularities committed without deliberate intent, through apathy, thoughtlessness, or inadvertence.

The latter for want of respect or obedience to superiors; irregularities in dress, and disorderly conduct out of the School.

The former consist of:—

1. Private admonition.
2. Punishment drill or extra guard during hours of recreation.
3. Stoppage of leave of absence for one or more holy days.
4. Imprisonment for less than twenty-four hours.

The latter are:—

5. Public reprimand before the whole class.
6. Imprisonment from one to eight days.
7. Stoppage of leave for one, two, or three months, or for the whole course.
8. Stoppage of vacations.
9. Solemn reprimand by the Director before all the classes.
10. Repetition of a six months' course.
11. Expulsion.

These may only be inflicted by the Council of Discipline, consisting of the Director as President, the Second in Command, the Third in Command, and the senior Officers. Awards by the Council of Dis-

cipline are carried out at once, with the exception of Expulsion, which must be confirmed by the Minister.

The lighter punishments may be awarded by the Officers, who, however, must report the case to the Director.

Expulsion may be carried out in two ways:—

First, after the approval of the Minister, by informing the father or guardian of the pupil, who is then allowed to send in a voluntary resignation. Secondly, the pupil may be summarily expelled; a notification being at the same time sent to the parents of the reason for so severe a measure.

The Council of Administration is composed of the Commandant as President, the Second and Third in Command, the next Senior Officer, and the Paymaster, who acts also as Secretary. They have charge of all expenses and accounts. The lesser and current expenses approved by the Council are ordered by the Commandant. All extraordinary expenses are submitted to the Inspector.

The library is under the control of an Officer, nominated by the Commandant. Pupils may obtain books therefrom every Thursday and Sunday, but must make good all losses and damage.

The Academy for Higher Studies, at the Astronomical Observatory of S. Ferdinando at Cadiz, is under the direction of a Captain, with a Senior Naval Engineer Officer as Sub-Director. The Professors consist of four or five Naval Lieutenants, three Naval Engineer Officers, two Artillery Officers, and various civilians.

Naval Sub-Lieutenants, with not less than three years' service, and Naval Lieutenants, are admitted, if they have proved themselves fit; that is if they have obtained in their examinations the classification, excellent or very good. The course lasts four years, and includes Higher Algebra, Analytical and Descriptive Geometry, Chemistry, Calculus, Mechanics, Practical Astronomy, Physics, Land Surveying, French, English, and German.

Other Schools.

School of Naval Engineering.—At the arsenal of Ferrol, admission is by competitive examination. The course lasts three years. Age of candidates must be between eighteen and twenty-six. On passing successfully the final examination candidates become 2nd Class Engineers with the rank of Lieutenant.

Academy of Naval Artillery, at San Carlo, Cadiz. Under the direction of a Colonel of Artillery, with a Lieutenant-Colonel as Sub-Director. The conditions of admission are—

Competitive examination.

Age between sixteen and twenty-one.

Aptitude for military profession.

The pupils are divided into three classes—

a. Those who go through a six months' preparatory course without pay.

b. Those in their second or third year who receive the pay of Midshipmen of 1st Class.

c. Officers.

At the end of their studies they obtain the rank of Lieutenant of Artillery.

General Academy for Marine Infantry.—For the training of Marine Officers, non-commissioned officers, and corporals.

Age of admission, eight to fourteen. All remain in the School till the age of eighteen. Pupils, on reaching the age of sixteen, if they prove themselves unfit for the rank of Officer, are enrolled as corporals in the corps of Marine Infantry, in which they have to serve for eight years, in compensation for the education they have received. The number of pupils is 100, for the most part sons of Officers who have died in the Service.

School for Corporals and Gunners.

School for Seamen.

Torpedo School.

School of Naval Administration.

Italy.

The Royal Naval Academy was founded at S. Jacopo, near Leghorn, towards the end of 1881, on the suppression of the Naval Schools of Genoa and Naples, which were inaugurated in 1817. It is under the direct authority of the Minister of Marine, who appoints an Admiral as Commandant of the School, assisted by a Post-Captain or Captain as Second in Command, and Director of Studies. The course lasts five years, and is divided into five classes, each of one year.

The Staff, in addition to the Commandant and Second in Command, consists of—

A Commander, in command of the companies.

A Lieutenant as Secretary.

Five Lieutenants, as Company Commanders.

Five Sub-Lieutenants, as Subaltern Company Officers.

Two Administrative Officers, the one acting as Secretary to the Council of Administration, the other as Paymaster and Purser.

A Religious Instructor.

Two Sanitary Officers.

The Military Educational Staff consists of—

A Naval Staff Officer for Hydrography, Astronomy, and Navigation.

A Staff Officer for Artillery.

A Naval Engineer Officer for Steam Engines and Naval Construction.

An Officer for Naval Manœuvres.

A Staff Officer for Submarine Mines.

Two of the company Officers act as instructors of simple navigation.

The civilian staff of professors consists of—

Six 1st class professors of sciences, with a salary of 4,000 lire[1] (increasing to 5,000).

[1] 1 lira = 1 franc.

Four 2nd class professors (3,500 lire per annum).
Eight 3rd class professors (3,000 lire per annum).
Six 1st class assistant professors (2,500 lire per annum).
One 2nd class assistant professor (2,000, 1,500, or 1,000, according to the numbers in his class).
Two Laboratory Assistants.
One 1st class Professor of Drawing, &c.
Three 3rd class Masters of Fencing and Gymnastics (1,500 lire).
Three 1st class Assistant Masters (3,000 lire).
Two 2nd class Assistant Masters (2,000 lire).
Two Laboratory Compounders (1,500 lire).

The admission to the Academy is by competitive examination, which takes place annually at the beginning of October; and the conditions of admission are:—

To be an Italian subject.

To be not more than fifteen years of age within the year of examination.

To be strong and without physical defect, able to read at first sight letters No. 15 of the Snellen Scale, at a distance of at least 12 metres with both eyes, and 6 metres with one eye; and free from colour blindness.

To be of good conduct.

To have father, mother, or guardian's consent to voluntary enrolment, before being nominated Officer.

To obtain the required standard in the competitive examination.

During their sojourn at the Royal Academy pupils must pay 800 lire per annum, paid quarterly in advance. Candidates, however, who belong to the following categories may obtain a remission of half these annual payments.

(a.) *For Family Services.*

1. Sons of naval and military Officers, and of civilians in the service of the State with a right to pension, provided they have not quitted the Service voluntarily, or through any culpable reason.
2. Sons of Officers decorated with the military order of Savoy, the military or naval order of valour, or the medal "dei mille."
3. Sons of Officers who have taken part in two or more campaigns.
4. Youths belonging to families who, through some signal service to the State, have acquired a claim to special merit, and have shown themselves worthy of particular consideration.

(b.) *For Personal Merit.*

1. Youths who in the entrance examination have taken one of the first ten places, provided they have obtained at least 80 per cent. of the marks.
2. Youths who take one of the first ten places at the end of each

yearly examination, provided again they obtain 80 per cent. of the marks.

A student may thus obtain a complete remission of all payment half through family services, and half through personal merit.

The privilege of obtaining a remission of half the costs for maintenance for family services extends over the whole course at the Academy, but is suspended in the event of the recipient having to repeat any one of the courses, through failure to pass any of the yearly examinations.

This privilege, however, when gained for personal merit extends for one year only.

The candidate's outfit must be paid for by the parents. This amounts to 800 lire, and may be paid in two instalments.

The instruction is divided into two courses—

1. The normal course.
2. The higher course.

The instruction in the normal course is theoretical and practical, and the subjects are divided into five classes. That in the higher course is divided into two classes, the first of which only is obligatory.

The theoretical instruction in the normal course lasts eight months in each year, *i.e.*, from the beginning of November to the middle of June. The practical instruction lasts three months, from July to October, on board of one or more vessels placed at the disposal of the Academy.

Examinations are held yearly, by which is determined the promotion of a pupil to a higher class. If a pupil fails to pass the examination, he is permitted to repeat the course; but this privilege is granted once only. Should he fail a second time, he *ipso facto* ceases to belong to the Academy, and is sent back to his family.

Final Examination.—On attaining eighteen years of age, the students, who have passed the examination at the end of the last class of the normal course, are nominated Midshipmen, provided they have spent at least twelve months on board some man-of-war. The final examination of the Royal Academy takes place under the supervision of a Committee, nominated by the Minister of Marine, and presided over by an Admiral.

The Higher Course.—First Period: When a Midshipman has obtained his promotion to Sub-Lieutenant, he must rejoin the Academy in order to attend the first period of the Higher Course. Those who are successful in the yearly examination are declared fit for promotion. In case of failure, a student may repeat the course once, but only once. The following are the subjects of study:—Applied Mechanics, Technological Chemistry, Technological Physics, Theory of Naval Construction, Steam Engines, Projectiles, Manœuvres, Tactics, and Naval Warfare, Hydrography, Military Law, International Law, Fencing, Musketry.

Second Period: The second period of the Higher Course is voluntary for Sub-Lieutenants who have passed the examination at the end of the first period. Officers of higher rank are also permitted to

follow this portion of the course. The Officers who pass successfully through the second period of this course receive a diploma, which entitles them to successive promotion in the Service.

Nomination to the Corps of Naval Engineers.—The students of the Academy who, from special aptitude and inclination, desire to follow up their career in the corps of Naval Engineers, must notify their intention to the Commandant of the Academy, after passing the yearly examination of the 4th class of the normal course.

This privilege is limited, however, to students who, in the examinations of the 4th and 5th class, obtain 80 per cent. of the marks in the Examinations in Sciences.

Those who comply with these conditions and whose application has been favourably received, are nominated Student Engineers in the corps of Naval Engineers, as established by the 17th article of the Law of December 3, 1878, on the organization of the personnel of the Royal Navy.

In order to obtain their nomination as 2nd Class Engineers, the students must follow a finishing course at the Higher Naval School at Genoa.

Nomination to the Commissariat Corps.—Should there be amongst the pupils at the Academy any who, however willing and of good conduct, have not the inclination to follow up the career of the General Staff, they may enter the corps of Naval-Military Commissariat, admission to which is by special examination.

Discipline.—All offences committed by the pupils are punished according to the scale laid down for the internal regulation of the Academy. The case of any pupil who shows himself callous to punishment, without giving any hope of changing his conduct, is brought before the Minister of Marine with a view to his expulsion from the Academy.

Dismissal of Pupils for Medical Reasons.—In the event of a pupil being in such a state of health as to prevent him from continuing in the Service, the Commandant will, on the opinion of the doctors of the establishment, to which may be joined that of other superior military medical officers or eminent civilian doctors, bring the case before the Minister with a view to his being sent back to his family.

The Council of Administration is composed as follows:—

The Second in Command, President.
The Officer in command of companies, member.
The Senior Company Commander.
The Chief Medical Officer.
An Administrative Officer, as Director of Accounts and Secretary.

The duties are to supervise all financial matters of the Academy; following the mode of procedure laid down in the regulations, and the rules in force for the Royal Navy.

The Council of Discipline is presided over by the Admiral in chief command, and composed of the Second in Command, the Officer in command of companies, the company Officers, and the Commandant's secretary.

The Rules of Administration.—During the normal course the Administration of the Institution has charge of the lodging and feeding of all the pupils at the Academy. Provision is made in a special and well-appointed building for the sick. All expenses for instruction and the necessary books are defrayed by the Administration. The families of the students are charged only for non-obligatory expenses, such as telegrams, stamps, journeys, non-regulation but permitted or authorized books, and finally, for such as are attributable to damage due to carelessness of the pupils.

Personal Accounts.—A sum of 240 lire is deducted annually from the costs of maintenance, and is credited to the personal account of the pupil, to defray the expenses of the repairs and renewal of his kit, and for washing bills and the purchase of toilet requisites. Should this sum be insufficient, the pupil must make good the deficiency. This personal account is closed at the end of the normal course, and sent to the pupil's family, together with a demand for any deficiency, or a credit note for any surplus there may be.

Students of the Higher Course.—The Officers who are attending the higher course are outside students of the Academy. They form a mess of their own, as on board ship; they defray all its expenses, as well as pay for all the text-books of the subjects under instruction.

The Examination.—The examination of candidates who have proved themselves medically fit commences at 9 A.M. on the 1st October, at the Royal Naval Academy. The Board of Examination is composed as follows:—

President.—The Second in Command and Director of Studies of the Academy, or a Post Captain.

Members.—Two superior Officers, and as many Officers and Professors of the Establishment as will form at least two sub-committees, in each of which there must be two Officers and two civilian Professors.

On the first day the candidates do a written paper on the Italian language, and one on arithmetic, set by the Board. These written papers are done under the supervision of the Board, and are private. On the succeeding days the oral examinations take place, and are public.

The following are the subjects of examination:—

Obligatory.—Italian language, 3 hours' written, and 20 minutes' oral, examination. Arithmetic, 2 hours' written, and 20 minutes' oral. History, 15 minutes' oral examination. Geography, 15 minutes' oral examination.

Voluntary.—French, English, and German, 15 minutes' written and oral examination.

(*To be continued.*)

NOTICES OF BOOKS.

Our Great Military Commanders. By C. D. YONGE. London: Ward and Downey, 1892. Pp. 413. Size $7\frac{1}{2}'' \times 5\frac{1}{2}'' \times 1\frac{3}{4}''$. Weight under $1\frac{3}{4}$ lbs. Price 6*s.*

This book contains a series of sketches of the lives of the Duke of Marlborough, Lord Clive, Duke of Wellington, Sir Charles Napier, Lord Gough, and Lord Clyde.

Cressy to Tel-el-Kebir. A Narrative Poem, descriptive of the Deeds of the British Army. By C. R. LOW. London: Mitchell, 1892. Pp. 343. Size $9'' \times 6'' \times 1\frac{1}{4}''$. Weight under $1\frac{3}{4}$ lbs. Price 10*s.* 6*d.*

This is a special form of military history, a narrative poem, the metre being "that adopted by Scott in 'Marmion,' Byron in 'The Giaour,' and by Coleridge, Moore, Campbell, and other poets."

Our Home Army. By H. O. ARNOLD FORSTER. London: Cassell and Co., 1892. Pp. 148. Price 1*s.*

This is a reprint of letters published in "The Times" in November and December, 1891, with a preface and notes, to which are appended suggestions for removing some of the existing defects in the condition of the British Army on the Home Establishment.

Admiral of the Fleet Sir Provo W. P. Wallis, G.C.B. A Memoir. By J. G. BRIGHTON. London: Hutchinson and Co., 1892. Pp. 299. Size $9'' \times 8\frac{1}{2}'' \times 1\frac{3}{4}''$. Weight under 2 lbs. 6 ozs. Price 16*s.*

An interesting account of the life of the well-known veteran sailor.

Smuggling Days and Smuggling Ways; or the Story of a Lost Art. By Lieut. the Hon. HENRY N. SHORE, R.N. London: Cassell and Co., 1892. Pp. 287. Size $8\frac{1}{2}'' \times 6'' \times 1''$. Weight under 1 lb. 6 ozs. Price 7*s.* 6*d.*

The author's apology in his preface for adding yet another drop to the stream in the already over-crowded state of the book market is quite unnecessary, for he has produced a book which is well worth reading. It enlightens the public generally on the subject, and also gives most interesting information with regard to the Coast-guard duties.

A General and his Duties. By Brigadier-General "B." London: Gale and Polden. Pp. 76. Price 1*s.* 6*d.*

The anonymous Brigadier-General may, perhaps, have found from his own experience that his brother Generals are ignorant of what he tells them in this little book; but, if so, Heaven help the British Army!

Journal of the United Service Institution of Victoria for the Year 1890–91. Vol. I. Edited by Captain F. R. REYNOLDS. Melbourne: Brain, 1892. Pp. 160.

The Colony of Victoria may be congratulated on the formation of the Institution, of whose Journal we have received the first volume. The papers are well up to the

mark. There is, however, a short addendum on the war game, which seems to be very significant as throwing light on the small amount of professional knowledge possessed by at all events some of the Officers of the Colonial forces. The war game is beyond them, and is not to be taken up at first "because it requires a knowledge of tactical principles."

Disposizioni Vigenti sulle Pensioni Militari in Italia ed in Altre Nazioni. By DANTE PARENTI, Ufficiale Commissariato Regia Marina Italiana. Livorno: Giusti, 1892. Pp. 304. Size 8″ × 6½″ × 1″. Weight under 1¾ lbs.

This is an interesting work giving information on pensions and pay of various European armies.

Friedrich, Napoleon, Moltke. Aeltere und Neuere Strategie. By HANS DELBRÜCK. Berlin: Walther, 1892. Pamph. Pp. 55. Price 1*s.* 6*d.*

An interesting pamphlet.

Messrs. Gale and Polden have published a useful pamphlet, *Changes in the New Infantry Drill*, 1892, *with Explanatory Notes.* It is compiled by Quartermaster W. GORDON. The price is 1*s.*, post free.

Modern French Artillery (*the St. Chamond, De Bange, Canet, and Hotchkiss Systems*), *with Illustrations of French War Ships.* By JAMES DREDGE. Chiefly reproduced from "Engineering." London: Offices of "Engineering," 1892. Folio. 500 pp. of Text, Tables and Plates, and over 700 Illustrations. Weight 9 lbs. 6 ozs. Price 2*l.* 10*s.*

This is a work beautifully prepared for the press. The information in it has been furnished in all cases from the manufacturers whose work is referred to, either direct or from authoritative publications. A large part of the volume is devoted to the artillery practices of the Forges et Chantiers de la Méditerranée, owing to the leading position this company occupies, and the great amount and variety of artillery it produces. Every page has been subjected to competent French criticism. A chapter is added on the French Navy. The illustrations are excellent.

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_____ 18

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8th ...	J. C. Mack	1,886	27th ...	R. G. T. Bright	1,795
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	A. R. C. Bavile ...	1,881	34th ...	H. S. Scott Harden ...	1,751
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